CA20N EAB -0 53

ENVIRONMENTAL ASSESSMENT BOARD



ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME:

2

DATE:

Tuesday, April 23, 1991

BEFORE:

HON. MR. JUSTICE E. SAUNDERS C

CHAIRMAN

DR. G. CONNELL

MEMBER

MS. G. PATTERSON

MEMBER



(416) 482-3277

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APPEARANCES

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	WATSON MARK)	Municipal Electric Association
	COUBAN MORAN)	Provincial Government Agencies
c.	MARLATT)	NORTH SHORE TRIBAL COUNCIL UNION OF ONTARIO INDIANS UNITED CHIEFS AND COUNCILS
			OF MANITOULIN WHITEFISH RIVER FIRST NATION
D	POCH	1	CONTINUON OF ENVIRONMENTAL
-	ARGUE)	COALITION OF ENVIRONMENTAL GROUPS
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н.	POCH)	
		•	
R.	POWER)	CITY OF TORONTO
)	& SOUTH BRUCE
C.	SPOEL)	VOICE OF WOMEN
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U.	FRANKLIN)	
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М.	KLIPPENSTEIN		POLLUTION PROBE
T.	HILL		TOWN OF NEWCASTLE
D.	ROGERS		ONGA AND NCA
s.	BLACKBURN		UNION GAS LIMITED
в.	BODNAR		CONSUMERS GAS
G.	GRENVILLE-WOOD		SESCI
D.	CHAPMAN		ENERGY PROBE
W.	TRIVETT		R. HUNTER
E.	LOCKERBY		AECL
	REID ALLISON)	OMAA
c.	GATES		CAC (ONTARIO)
F.	MACKESY		ON HER OWN BEHALF

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DRAFT EXHIBIT LIST as of April 3, 1991

Exhibit No.	Exhibit Title
(Note: Exhib	its 1-87 are submitted by Ontario Hydro)
1	Affidavit of Glen Edward MacDonald. April 3, 1990.
2	Document Repositories, Ontario Hydro.
3	Demand/Supply Plan Report, Ontario Hydro. December 1989.
4	Environmental Analysis, Ontario Hydro. December 1989.
5	Demand/Supply Plan Report Overview, Ontario Hydro. December 1989.
6	Plan Analysis, Ontario Hydro. December 1989.
7	Load Forecast Report No. 881212, System Demands, Ontario Hydro, Economics and Forecasts Division. April 1989.
8	Load Forecast Report No. 891211, System
	Demands, Ontario Hydro, Economics and Forecasts Division. December 1990.
9	Load Forecast Report No. 901210, System
	Demands, Ontario Hydro, Economics and Forecasts Division. December 1990.
10	Uncertainty in the Load Forecast: A
	Summary of Results Developed in 1988 and 1989, Ontario Hydro, Economics and Forecasts Division. December 1989.
11	Summary of the Short-term Economic Outlook - Spring Review, Ontario Hydro, Economics and Forecasts Division. May 1989.

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Exhibit No.	Exhibit Title
(Note: Exhib	its 1-87 are submitted by Ontario Hydro)
12	Retail Energy Price Trends, Annual Review, Ontario Hydro, Economics and Forecasts Division. October 1988.
13	Long-term Economic Outlook, Annual Review, Ontario Hydro, Economics and Forecasts Division. September 1988.
14	Energy Price Trends Report, Ontario Hydro, Economics and Forecasts Division. November 1990.
15	Long-term Economic Outlook - Annual Review, Ontario Hydro, Economics and Forecasts Division. September 1990.
16	1990 Residential Sector End-Use Forecast, Ontario Hydro, Economics and Forecasts Division. December 1990.
17	1990 Commercial Sector End-Use Forecast Ontario Hydro, Economics and Forecasts Division. December 1990.
18	1990 Industrial Sector End-Use Forecast, Ontario Hydro, Economics and Forecasts Division. December 1990.
19	State-of-the-Environment Report 1988, Ontario Hydro, Environment Division. October 1989.
20	State-of-the-Environment Report 1988, Executive Summary, Ontario Hydro, Environment Division. October 1989.
21	State-of-the-Environment Report 1989, Ontario Hydro, Environment Division. October 1990.

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Exhibit No. Exhibit Title

(Note: Exhibits 1-87 are submitted by Ontario Hydro)

22 State-of-the-Environment Report 1989, Executive Summary, Ontario Hydro, Environment Division. October 1990. 23 Accounting for the Environmental Consequences of Electricity Resources During the Power Planning Process, Issue Paper No. 89-7, Northwest Planning Council. April 1989. 24 Independent Consultant Review of Ontario Hydro Expectations and Targets for Demand Management Activities, Final Report, RCG/Hagler Bailly Inc. August 1989. 25 Demand Management in the 1989 Demand/Supply Plan, Ontario Hydro, Corporate Planning Branch and Energy Management Branch, December 1989. 26 The 1989 Non-Utility Generation Plan, Ontario Hydro, Non-Utility Generation Division. August 1989. 27 Fact Sheet: Municipal Incinerators -Pollution Control System, Environment Canada. December 1986. 28 The Hydraulic Plan, Ontario Hydro. December 1989. 29 1988 Bulk Electricity System Transmission

Report, No. 671 SP, Ontario Hydro, System

Planning Division. October 1988.



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(Note: Exhibits 1-87 are submitted by Ontario Hydro)

30	Hydraulic Power Resources of the Province Development of Ontario, Inventory Report No. 82572, Ontario Hydro, Hydraulic Studies & Development Department. December 1982.
31	News release - Ontario announces new parks and more protection for wilderness & nature reserves, Ontario Ministry of Natural Resources. May 1988.
32	Background Information: Transmission Associated with the Hydraulic Plan, Ontario Hydro, Transmission System Planning Department. August 1990.
33	Background Information: Transmission Associated with the Manitoba Purchase, Ontario Hydro, Transmission System Planning Department. August 1990.
34	Thermal Cost Review 1989, Volumes 1 and 2, Ontario Hydro, Thermal Cost Review Committee. August 1989.
35	Thermal Cost Review, Volumes 1 to 3, Ontario Hydro, Thermal Cost Review Committee. October 1989.
36	Thermal Cost Review Assessment Report, Monenco Consultants Inc. August 1989.
37	What will be the Fate of Clean Coal Technologies?, Curver, P.C., Environmental Science Technology, Volume 23, No. 9 September 1989.



Exhibit No.	Exhibit Title
(Note: Exhib	its 1-87 are submitted by Ontario Hydro)
38	Turbines for Tomorrow: Utility Turbopower for the 1990's, EPRI Journal. April/May 1988.
39	Review of the Economic, Technical and Environmental Studies on Clean Coal Technologies, Technical Memo No. TM89/4, Ontario Hydro, Environment Studies & Assessments Department. March 1989.
40	Task Force on the Greenhouse Effect, No. 678 SP, Ontario Hydro, Environmental Technical Committee. November 1989.
41	Options Available to Meet Acid Gas Limits and Selection of Preferred Options, Report to the Lieutenant Governor in Council, Ontario Hydro. January 1989.
42	Coal Comes Back as a Gas, Patterson, W., New Scientist. April 1989.
43	Ontario Hydro Presentations to the Ontario Nuclear Cost Inquiry, Ontario Hydro, Corporate Planning Branch. November 1988.
44	Report to the Minister of Energy, Ontario Nuclear Cost Inquiry. January 1989.
45	The Safety of Ontario's Nuclear Power Reactors. A Scientific and Technical Review, Report to the Minister from the Ontario Nuclear Safety Review. February 1988.

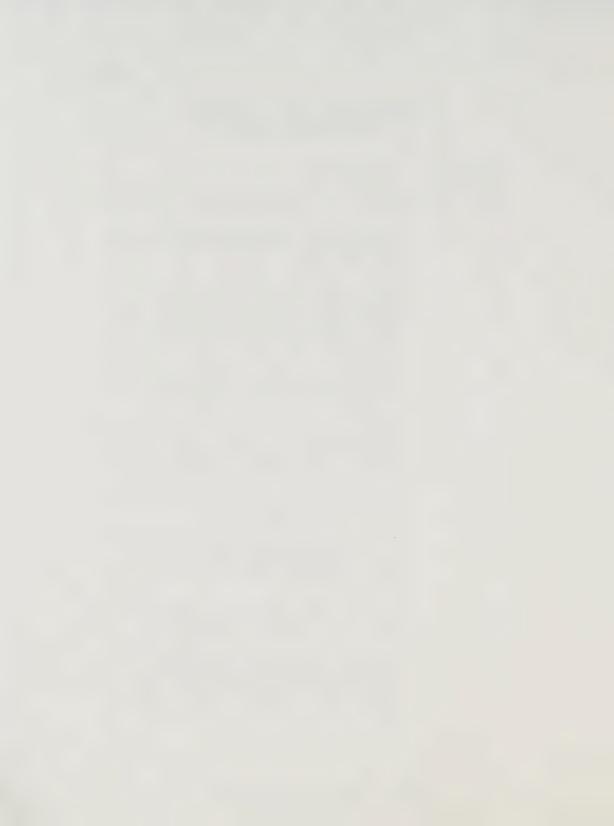


Exhibit No.	Exhibit Title
(Note: Exhib	its 1-87 are submitted by Ontario Hydro)
46	An Introduction to the Twenty-Year Resource Plan, B.C. Hydro. April 1989.
47	Energy and Environment - How to Implement Sustainable Futures, Kristoferson, L. 1988.
48	The Michigan Electricity Options Study Final Report, Michigan Department of Commerce. October 1987.
49	Corporate Relations Outlook 1989, Ontario Hydro.
50	Meeting Future Energy Needs - Draft Demand/Supply Planning Strategy Reference Report: Analysis of Representative Plans - Social and Community Impacts, Ontario Hydro, Corporate Relations Branch. January 1987.
51	Meeting Future Energy Needs - Draft Demand/Supply Planning Strategy Reference Report: Provincial Economic Impact Assessment of the Representative Plans, Ontario Hydro. September 1986.
52	Meeting Future Energy Needs - Draft Demand/Supply Planning Strategy Reference Report: Transmission Aspects of the Representative Plans, No. 660, Ontario Hydro. April 1987.
53	Meeting Future Energy Needs - Draft Demand/Supply Planning Strategy Reference Report: Analysis of Representative Plans - Environmental Impacts - Generation Report No. 86193, Ontario Hydro. August 1986.

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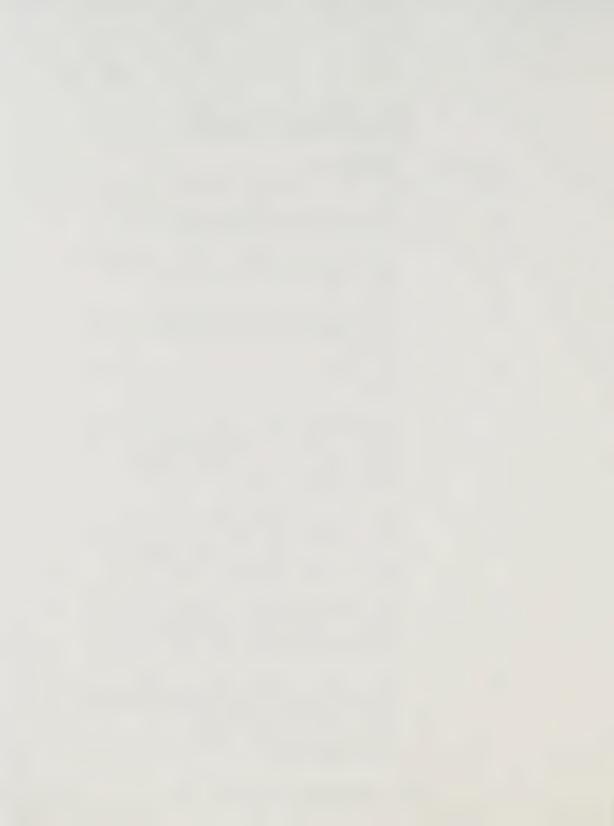


Exhibit No.	Exhibit Title
(Note: Exhib	its 1-87 are submitted by Ontario Hydro)
54	Our Common Future, The World Commission on Environment and Development, (The Brundtland Report). 1987.
55	World Energy Conference Report, Environmental Effects Arising from Electricity Supply and Utilisation and the Resulting Cost to the Utility. October 1988.
56	Working Paper, Meeting Future Energy Needs. An Initial Review of the Options. Report No. 651SP, Ontario Hydro, System Planning Division. November 1985.
57	Demand/Supply Options Study, The Options, No. 652SP, Ontario Hydro, System Planning Report. February 1986.
58	Ontario Hydro Presentations to the Select Committee on Energy Demand/Suypply Options, Ontario Hydro. April 1986.
59	Final Report on Toward a Balanced Electricity System, Select Committee on Energy. July 1986.
60	Meeting Future Energy Needs - Provincial Organization Consultation Program Summary Report, Volume 1, The Consultation Process, Ontario Hydro, Corporate Relations Branch. May 1986.
61	Meeting Future Energy Needs - Provincial Organization Consultation Program Summary Report, Volume 2, Summary of Submissions, Ontario Hydro, Corporate Relations Branch. April 1986.

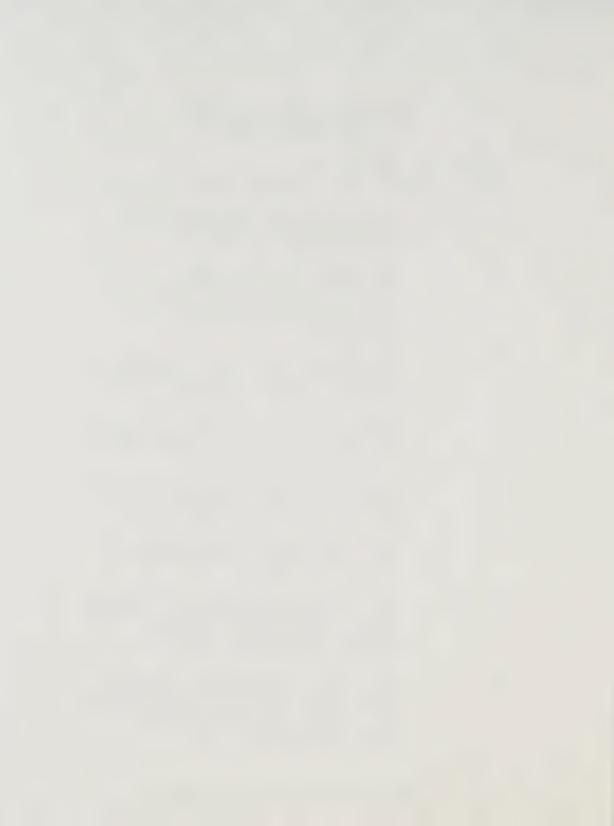


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- Meeting Future Energy Needs Provincial Organization Consultation Program Summary Repoort, Volume 3, Submissions by Organizations, Ontario Hydro, Corporate Relations Branch. May 1986.
- Meeting Future Energy Needs Study Regional Consultation Program, Ontario
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- Meeting Future Energy Needs Study Regional Consultation Program,
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 Ontario Hydro, Corporate Relations
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- Meeting Future Energy Needs Study Regional Consultation Program, Utility
 Meeting, No. SCS 86005, Ontario Hydro,
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- Meeting Future Energy Needs Draft Demand Supply Planning Strategy. No. 666SP, Ontario Hydro, System Planning Division. December 1987.
- 67 Meeting Future Energy Needs. Draft
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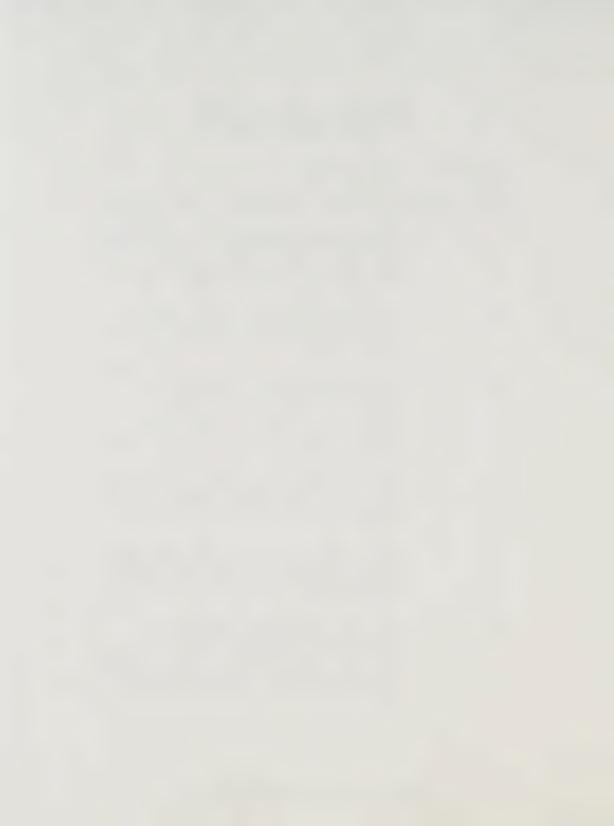


Exhibit No.	Exhibit Ti	tle

(Note: Exhibits 1-87 are submitted by Ontario Hydro)

- Review of Ontario Hydro's Draft Planning
 Strategy. Report of the Electricity
 Planning Technical Advisory Panel to the
 Minister of Energy, Ontario Hydro,
 Electricity Planning Technical Advisory
 Panel. July 1988.
- Review by Government Ministries of Ontario Hydro's Draft Demand/Supply Planning Strategy. Report to the Minister of Energy, Government Miistries. July 1988.
- 70 Draft Demand/Supply Planning Strategy No. 666B SP, Ontario Hydro, System Planning Division. Hydro, System Planning Division. September 1988.
- 71 Report on Ontario Hydro Draft
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 1, Recommendations, Select Committee on
 Energy. January 1989.
- 72 Report on Ontario Hydro Draft
 Demand/Supply Planning Strategy, Volume
 2, Staff Comments, Select Committee on
 Energy. January 1989.
- 73 Draft Demand/Supply Planning Strategy Review, No. 666C SP, Ontario Hydro, System Planning Division. April 1989.
- 74 Demand/Supply Planning Strategy, No. 666D SP, Ontario Hydro, System Planning Division. March 1989.



Exhibit No.	Exhibit Title
(Note: Exhib	its 1-87 are submitted by Ontario Hydro)
75	The Report of the Royal Commission on Electric Power Planning, Environmental and Health Implications of Electric Energy in Ontario, Volume 6. February 1980.
76	Net Load Impact Forecast of Demand Management Programs, Ontario Hydro, Economics and Forecasts Division. January, 1991.
77	The 1990 Econometric Load Forecast, Ontario Hydro, Economics and Forecasts Division. January 1991.
78	1989 Bulk Electricity System Transmission Report, No. 679SP, Ontario Hydro, System Planning Division. October 1989.
79	Principal Power Facilities and Municipal Systems Served, Ontario Hydro. June 1988.
80	Ontario Demographic Forecast (1990 - 2015), Ontario Hydro, Economics & Forecasts Division. June 1990.
81	Market Referencé Dataset, No. MS & DD 88 - 24, Ontario Hydro, Energy Management Branch. December 1988.
82	Hydroelectric Power Resources of the Province of Ontario, No. 87360, Ontario Hydro, Geotechnical & Hydraulic Engineering Department, October 1987.

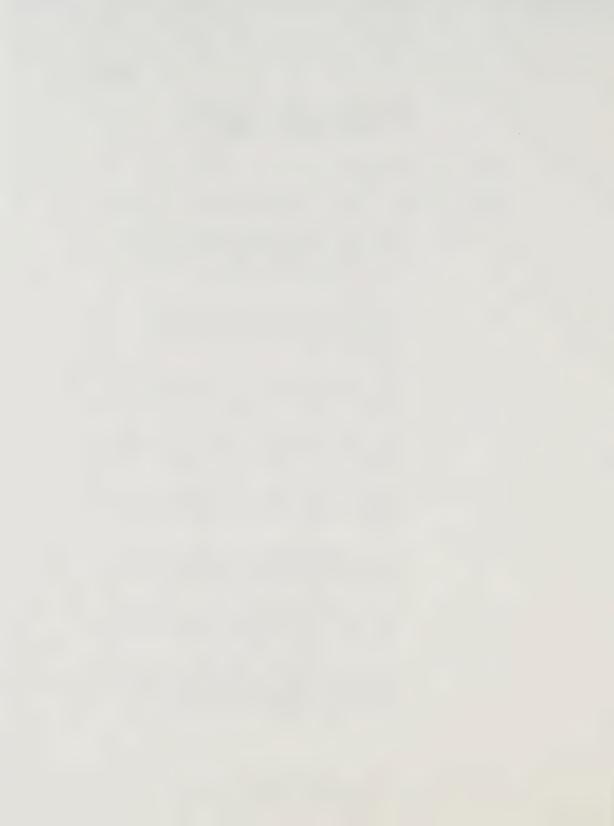
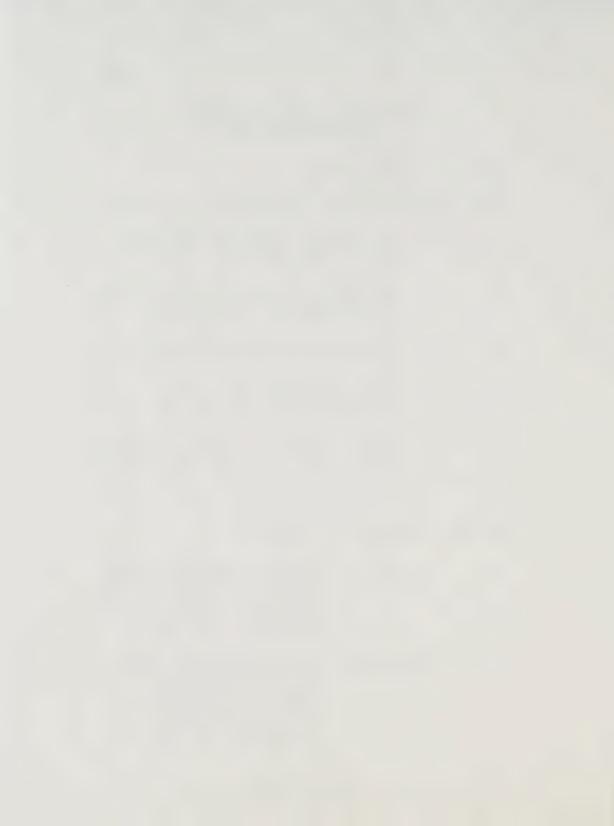


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(Note:	Exhibits 1-87 ar	e submitted by Ontario Hydro)
83	Ontario Hy	on-Utility Generation Plan, dro, Non-Utility Generation September 1990.
84	Demand/Sup	st Determination for the 1989 ply Plan, Ontario Hydro, System ivision. February 1991.
85		st Update, Ontario Hydro, nning Division. February 1991.
86	Demand/Sup	Corrections to the ply Plan, Ontario Hydro, System ivision. August 1990.
87	Criteria,	Generation Reliability Planning Report DS1 9101, Ontario Hydro, nning Division. March 1991.
Exh. No.	Submitted by	Description
88	Coalition of Env. Groups	Demand-side Resources as an Option for Reducing Bills in the City of Chicago, Charles Komanoff, Komanoff Energy Associates. May 1990.
89	Coalition of Env. Groups	Some Preliminary Critical Analysis of Ontario Hydro's 25-Year Business Plan: Providing the Balance of Power, Judy Smith and Ralph Torrie, Torrie Smith Associates. July 1990.



Exh. No.	Submitted by	Description
90	Coalition of Env. Groups	Loaded questionNew approaches to utility forecasting, John B. Robinson, Energy Policy. February 1988.
91	Coalition of Env. Groups	Report on the adequacy of Ontario Hydro's Estimates of Externality Costs Associated with Electricity Exports, Emily Caverhill and Paul Chernick, Resource Insight Inc. January 1991.
92	Coalition of Env. Groups	Energy Use Efficiency and Nuclear Generation as Competing Supply Sources, Charles Komanoff, Komanoff Energy Associates. Public Utilities Fortnightly. February 2, 1989.
93	Northwatch	Efficient Use of Electricity, Arnold P. Fickett, Clark W. Gellings, Amory B. Lovins. Scientific American. Vol 262, No. 9. September 1990.
94	Northwatch	The Negawatt Revolution, Amory Lovins. Across the Board. September 1990.
95	Northwatch	Energy, People, and Industrialization, Amory Lovins, Rocky Mountain Institute. January 5, 1989.

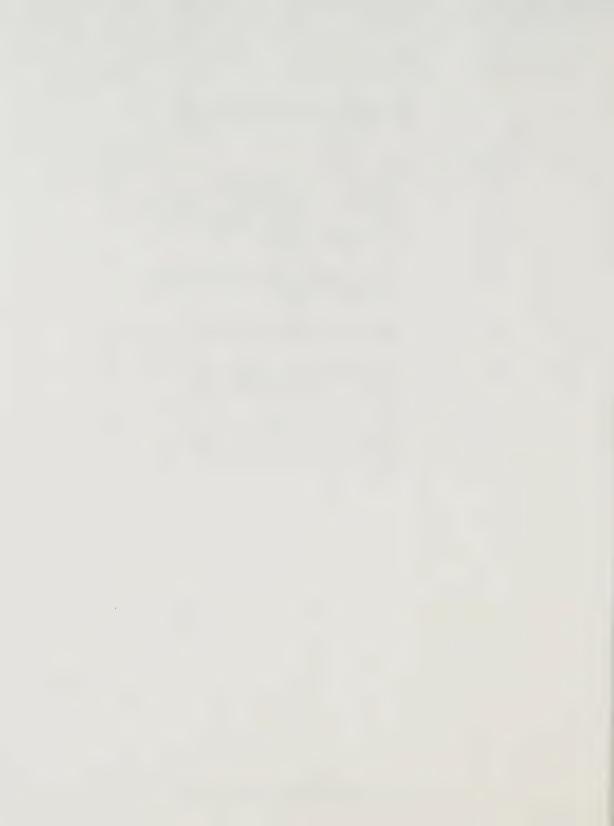


Exh. No.	Submitted by	Description
96	Ontario Hydro	Affidavit of Brenda Rose Duffy. April 21, 1991.
97	IPPSO	Notes on Ontario Hydro's Forecasting Activities, Dr. Christopher Chapman. April 1991.



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97	"Notes on Ontario Hydro's Forecasting Activities," submitted by the Independent Power Producer Society of Ontario. Author: Dr. Christopher Chapman.	ed s	211
98	Ontario Hydro's complete set of witness statements. Also CV of Dr. Buja-Bijunas.		272
99	Package entitled "Overheads used by Mr. Rothman in Direct Evi		273 e."
100	Package entitled "Overheads Used by Mr. P. Burke and Dr. L. Buja-Bijunas in direct evidence."		273
101	List of interrogatories to be referred to by Ontario Hydro's witnesses in direct evidence for Panel 1.		275



1	Upon commencing at 10:02 a.m.
2	THE REGISTRAR: This hearing is now in
3	session. Please be seated.
4	THE CHAIRMAN: Since yesterday there has
5	been another exhibit filed which I will put into the
6	record. It will be marked as Exhibit No. 97.
7	It is dated April 1991. Its title is
8	"Notes on Ontario Hydro's Forecasting Activities." And
9	its author is Dr. Christopher Chapman. It is submitted
0	by the Independent Power Producers Society of Ontario.
1	EXHIBIT NO. 97: "Notes on Ontario Hydro's Forecasting Activities," submitted
2	by the Independent Power Producers Society of Ontario. Author: Dr.
.3	Christopher Chapman.
4	THE CHAIRMAN: The next is the Coalition
5	Environment Group.
6	OPENING STATEMENT BY MR. D.POCH:
7	Good morning, Mr. Chairman, members of
8	the panel. My name is David Poch on behalf of the
9	Coalition of Environmental Groups for a sustainable
0	energy future. The Coalition, as it has come to be
1	known.
2	The panel will be aware that we have
3	filed a written statement which sets out our position
4	on Hydro's approach and how our approach would differ.
5	We have made copies available to a number of the

1	parties. It is some 36 pages long. If others who
2	desire a copy would like one, they can contact my
3	office and we will make one available to them. I would
4	ask that be made part of the record in some fashion. I
5	don't know what the Board's practice will be with such
6	documents. I don't propose to read it.
7	Suffice to say that a serious energy
8	efficiency program coupled with a modest non-utility
9	cogeneration effort can more than meet the foreseeable
10	need for electricity if Hydro's plan to increase market
11	share is rejected.
12	In the evidentiary phase of this hearing,
13	we will set out both the technologies and the
14	techniques to achieve that result, and the panel will
15	be aware that we have quite a cadre of experts
16	developing that scenario in some detail and we will
17	present that to you when it is our turn.
18	We will be able to demonstrate how
19	Hydro's conservation program is little more than
20	tokenism when compared to what can be done in a
21	concerted effort. In our view, Hydro's effort is
22	little more than a public relations cover to allow them
23	to carry on in the mode of a nuclear construction
24	company.
25	We will demonstrate to you that even if

1	you look at the world through narrow accountants'
2	glasses, if you will, as we believe that Hydro does,
3	there is an alternative which is a better, a cleaner, a
4	cheaper, and a less risky alternative in the form of
5	conservation and cogeneration.
6	Now, I don't propose to dwell today on
7	the technical debate on those points. Rather, I would
8	like to focus on what we view as perhaps the real issue
9	in these hearings.
10	The Chairman noted quite appropriately
11	yesterday that these hearings are getting off to a
L 2	start on Earth Day. The fact that we mark Earth Day,
13	an anniversary, is a recognition, wide-spread
1.4	recognition, that we are on a path of unsustainability.
15	We are threatening our ecosystems. And that creates an
16	imperative for change, for change in the way we do
L7	business.
L8	This is another anniversary this week as
19	well: It's the fifth anniversary of the Chernobyl
20	disaster.
21	And this hearing is a unique opportunity
22	to act on both of those agendas. It is a unique
23	opportunity in its scope, in its scale, and its
24	importance, and its perhaps unique worldwide. There

are hearings on particular plants, there are rolling

_	praining hearings in other jurisdictions. This is
2	really something special.
3	But, unfortunately, in our view, Ontario
4	Hydro has come forward with a narrow 1950s-style
5	business plan which will perpetuate the destructive
6	role that they and we, all of us as their subscribers,
7	have played.
8	Now it would be bad enough if that
9	approach led us to the flooding of one valley or the
10	risk of one additional reactor or one additional smoke
11	stack. But this hearing isn't about one generating
12	plant or a transmission line. This is a 25-year plan
13	which will encourage a whole style and form of energy
14	system development, one that I think we all recognize
15	is unsustainable. It can't go on in perpetuity.
16	Exponential growth in the provision of energy will
17	bankrupt our economies and certainly our ecology.
18	This plan is a plan to spend some
19	\$200-billion perpetuating an approach which is really
20	threatening both our lives and our environment. It's
21	difficult to grasp the scale we are talking about, but
22	we must.
23	Now Hydro and its allies, its traditional
24	allies, groups you have heard from yesterday, groups

such as the Municipal Electrical Association, the

Association of Major Power Consumers, the Nuclear
Industry Agencies, AECL Society and so on would place
us in the position of having to choose between dams in
the fragile north and aboriginal lands or threatening
entire regions of the province with the risk associated
with nuclear power or indeed threatening, adding to the
threat of the global environment in the case of global
warming.

I think it will be apparent to you by now that we reject that dilemma. It is a false dilemma in your view. And we would ask you to be most cautious and not allow Hydro to trap you in such a "business as usual" paradigm.

You are the Environmental Assessment
Board. You must count environmental and social
impacts. And you must recognize that this is the first
time in history when a public inquiry has been given
the authority in law to regulate Hydro, so you must
seize that unprecedented opportunity. There has never
been an environmental assessment hearing for an Ontario
Hydro generating station, never.

Now, while Hydro has faced many reviews you have heard the list - they have never had to listen
to the conclusions of these reviews. Indeed, in many
occasions they have rejected them in total or in

1	degree. They will have to listen to your conclusions.
2	So, you can do something significant and
3	lasting to save the environment. You can do something
4	to enable us to avoid the horrific risks implicit in
5	Hydro's plan. And in the process, I think we are
6	pleased to observe, you can help our economy to move
7	from a dead end path to a sustainable one.
8	The government has put in place an
9	indefinite moratorium on nuclear development.
10	Implicitly they have asked this Board to determine the
11	feasibility of an alternative to more nuclear power to
12	see if there is a reasonable alternative to the plan
13	that Hydro presents.
14	We believe that there is not only a
15	reasonable and feasible alternative; there is a far
16	superior one. Ontario can become a world leader in the
17	techniques, in the technologies of efficiency. It can
18	reap the dual rewards of environmental protection and
19	economic prosperity, a new type of economic prosperity.
20	Or we can perpetuate the status quo.
21	In our view that would be suicidal
22	myopia. It is a matter of choice.
23	Thank you.
24	THE CHAIRMAN: Thank you, Mr. Poch.
25	Energy Probe: Mr. Chapman.

OPENING STATEMENT BY MR. CHAPMAN:
Good morning, Mr. Chairman, members of
the Board.
Energy Probe's participation at this
hearing will be to contrast Hydro's plans with other
decentralized electrical supply systems and
characterized by full cost internalization and equal
access to the power grid for any and all suppliers,
public or private.
And of course Energy Probe believes that
a thorough examination of these issues is essential to
ensure a complete assessment of Hydro's plan.
Energy Probe strongly believes that it is
counter to the public interest to approve this 25-year
plan before first testing it against decentralized
models and weighing the advantages and disadvantages of
electricity restructuring in Ontario against Hydro's
plan.
This position of Energy Probe, I suggest,
is vindicated when one looks at the recent trends
toward decentralizing the electrical utilities in other
Western nations. The movement away from centralized
monopolies has been spurred on by the improving
technologies in electricity conservation, the need to

reduce pollution caused by megaprojects, such as

1	nuclear and fossil fuel plants, the effects of large
2	hydraulic plants on aboriginal life and, of course, the
3	need to reduce public debt.
4	At this hearing, Energy Probe will be
5	drawing the panel's attention to the many proposals now
6	being implemented in the Western world to avoid these
7	costs and to take advantage of new technology. And
8	there are many recent developments.
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1	Mr. Adams has a series of three maps that
2	I just wish to bring to your attention. The first one
3	is the situation back in 1970 with respect to
4	competition in the electricity business and you will
5	see that the only country that is marked green is West
6	Germany, and West Germany was the first to experiment
7	with decentralizing their electrical utilities.
8	The next map is the situation in 1980
9	where you see that the United States has now joined
10	with West Germany in experimenting with different types
11	of decentralization, and finally, the situation in 1990
12	is represented by this map and the green areas, of
13	course, are the areas that have moved forward
14	decentralization, and you will notice that all the
15	western world has begun to decentralize except for
16	parts of Canada and Ireland.
17	Thank you, Mr. Adams.
18	So the world is turning green and the
19	world is turning away from large monopolized
20	centralized utilities and the building of mega projects
21	of nuclear, fossil fuel and hydraulic plants. I submit
22	that all of these are characterized by their negative
23	environmental consequences and their enormous costs.
24	Now, most of these costs will be detailed by other
25	intervenors at these hearings, including the aboriginal

1	groups, The Vo	ice of Women, the Coalition of
2	Environmental	Groups, and the International Institute
3	of Concern for	Public Health, Northwatch, and others.
4		As are you aware, Energy Probe has
5	retained Mr. L	arry Ruff of PHB Consultants for this
6	hearing. Mr.	Ruff has been a leading adviser to
7	governments in	Britain, Spain, Australia, and others
8	around the wor	ld involved in the recent trends torward
9	electricity re	structuring.
0		Now, commenting on Energy Probe's case at
1	this hearing,	Mr. Ruff warns, and I quote:
2		"The utility that is the subject of a
3		potential competitive restructuring is
4 .		likely to oppose the idea, introducing
5		competition is both an implicit admission
6		that the existing system is flawed and a
7		threat to the institution and the people
8		in it."
9		Now, this certainly has been the
0	experience of	Energy Probe at the prehearing stage, and
1	I am not sure	it will change during the hearing.
2		Ontario Hydro, I suggest, has been and
3	will continue	to be extremely threatened by Energy
4	Probe's positi	on that this plan and its assessment
5	include a comp	parison to decentralized approaches being

1	preferred and implemented throughout the rest of the
2	Western World. Unfortunately, by Hydro not including
3	competitive restructuring as an issue to be
4	investigated at this hearing, Hydro removes any onus
5	under the Environmental Assessment Act that would be
6	placed on them to justify their plans versus these
7	other developments around the world. By excluding this
8	type of comparison in their plan, Energy Probe, an
9	intervenor, now bears the onus of proving that Hydro's
10	plan is incomplete for lack of insufficient information
11	to base a decision on.

Energy Probe believes, however, that the funding awarded to it will allow it to establish that Hydro's assessment is incomplete and that Ontarians should not be committed to massive construction projects before this environmental assessment more thoroughly investigates other proposals. And today at the outset of the hearing, Energy Probe is putting Hydro on notice of our position that their assessment is incomplete and Energy Probe will be making this case throughout the hearing.

Furthermore, Energy Probe will urge
Ontario Hydro to stop unduly limiting this hearing by
their references to the Power Corporation Act and to
fulfill the requirements of planning set out in the

1 Environmental Assessment Act. 2 As we all know, the Environmental 3 Assessment Act's very purpose is for the betterment of the people of Ontario by providing for the protection, 4 conservation and wise management in Ontario of the 5 6 environment. If the Power Corporation Act, as it 7 exists today, does not allow Hydro to carry out its plans in accordance with that purpose, then Energy 8 9 Probe will argue that the plan should be denied. 10 The Power Corporation Act will undoubtedly be subject to a great deal of amending in 11 12 the coming years, partly because of this hearing and 13 partly because of the possible changing of governmental policies torward marginal cost pricing and least cost 14 15 planning, nuclear power and conservation, 16 At this hearing of a 25-year plan, which 17 may run for more than two years and cost over 18 \$100-million, it's my submission that it is not good 19 enough for Hydro to use the Power Corporation Act as a 20 shield against a full and complete environmental 21 assessment of their plans. This would be unfair to the 22 people of Ontario who are paying Hydro's freight and it

Energy Probe's evidence at the hearing on

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would be unjustifiable under the Environmental

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Assessment Act.

1	decentralized options will represent the first
2	opportunity many Ontarians will have had to see the
3	benefits of a decentralized utility, and I suggest it
4	will surprise many people.
5	Ontario Hydro of course takes the
6	position that the decentralized option is an
7	unreasonable one, so unreasonable as to be unworthy of
8	funding and never to be investigated as part of their
9	plans. And significantly, Ontario Hydro is on the
10	record as supporting the judicial review of this
11	Board's decision to allow Energy Probe to inquiry into
12	these matters.
13	Once the information is available, Energy
14	Probe will advocate that Hydro's assessment needs to be
15	broadened to include the effect that decentralization
16	would have on their forecast of supply and demand.
17	A recent article in the Globe and Mail
18	eight days ago was written by Jack Gibbons. Mr.
19	Gibbons is a senior economic advisor to the Canadian
20	Institute for Environmental Law and Policy, he is also
21	significantly a former member of the Ontario Energy
22	Board staff. His article was entitled "Switching
23	Tactics," and it states that conservation is not in
24	Ontario Hydro's best corporation interest and therefore
25	the solution is to restructure Hydro and to oppose a

1	permanent ban on the construction of new electrical
2	generating stations by Ontario Hydro.
3	Energy Probe is starting from a position
4	divorced from left or right wing ideologies. We will
5	be demonstrating the environmental and economic
6	advantages of competition.
7	Under a closer examination of Ontario
8	Hydro's plan and the environmental consequences of such
9	plans, it will become apparent during the hearing that
. 0	new ideas, technologies and markets, are needed to deal
.1	with the no-win proposition that Hydro has offered the
. 2	people of Ontario in this plan. Those new ideas
.3	already exist and are being implemented throughout the
.4	world and Energy Probe will introduce them to this
.5	panel before a decision is made on the completeness of
6	Hydro's plan and before an ultimate decision on the
7	merits of Hydro's plan.
8	Just in closing, I would like to refer
9	Mr. Chairman and Members of the Board to this morning's
0	Toronto Star. There are two interesting articles
1	concerning nuclear power. The first deals with the
2	British government cover-up with respect to data
3	concerning radioactive fallout in England as a result

of the Chernobyl nuclear disaster. Now England is some

2000 kilometres away from that diaster. Also and more

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1	important for our purposes is an article quoting
2	William Riley, the Director of the United States
3	Environmental Protection Agency. Mr. Riley indicates
4	that the Chernobyl disaster caused a deep distrust of
5	nuclear technology among Americans, and I'm quoting:
6	"And no U.S. utility is seriously considering a new
7	nuclear reactor."
8	He goes on to say, the April 26, 1986
9	explosion at Chernobyl shattered sometimes excessive
10	faith in certain technologies and taught us a great
11	many lessons.
12	It would appear that Ontario Hydro has
13	not yet learned these lessons.
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1	And finally, Energy Probe and myself as
2	counsel look forward to a full and complete hearing and
3	to Hydro and its 25-year plan for our future energy
4	needs. Thank you.
5	THE CHAIRMAN: Thank you, Mr. Chapman.
6	The Voice of Women?
7	OPENING STATEMENT BY MS. SPOEL:
8	Good morning. My name is Catherina
9	Spoel. It is S-P-O-E-L, and I am appearing as counsel
10	for the Voice of Women. Our corporate name is Canadian
11	Voice of Women for Peace, but I will refer to them as
12	Voice of Women.
13	Voice of Women are a group of citizens
14	who have been active for over 30 years in areas of
15	peace and social justice.
16	Voice of Women is participating in this
17	hearing primarily for two purposes: First of all, to
18	ensure that the social and political values and
19	assumptions that are implicitly incorporated into the
20	Demand/Supply Plan are articulated and clearly
21	presented to the Board.
22	The second reason is to present evidence
23	on the implications that continuing development of
24	nuclear power have for the development and
25	proliferation of nuclear weapons which Voice of Women

1	submits is a threat to the wellbeing of all of us on
2	this planet, including those of us who live in Ontario.
3	Our concerns at this hearing are not so
4	much with the technicalities of electrical power
5	generation as with the social and political values and
6	assumptions embedded in this undertaking, although
7	those are not often explicitly acknowledged or
8	justified.
9	If this undertaking is approved, it will,
10	in fact, determine a large component of Ontario's
11	future energy policy simply by providing for permanent
12	and costly infrastructure for the province's electrical
13	supply system.
14	We submit that the presence of this
15	infrastructure will tie future Ontario citizens,
16	financially and practically, to energy options which
17	are not necessarily of their choosing.
18	We submit that existing permanent
19	infrastructure is often also a barrier to innovation
20	and change.
21	It appears to Voice of Women that the
22	basic planning assumptions of the plan were derived by
23	Ontario Hydro for an assessment of future essentially
24	price-based customer choices; however, we submit that
25	planning for Ontario's energy future must also be based

1	on the social and political values of the people of
2	Ontario and not merely on customer choices that appear
3	to be the basis for Ontario Hydro's planning.
4	In organizing the presentation of its
5	evidence, it appears that Ontario Hydro has left the
6	discussion of overall assumptions in the plan for Panel
7	ll, the last of their panels.
8	This is of particular concern to us as a
9	part-time intervenor because we have since discovered
10	that some of these assumptions arise in a number of the
11	earlier panels in a peripheral way, which may mean that
12	you see us more often than we had intended.
13	It seems to us that this is an
14	inappropriate ordering of the hearing since the effort
15	and expenditure of an assessment of the undertaking is
16	justifiable only if the assumptions on which it is
17	based are clearly stated and, on reflection, considered
18	to be valid by the Board.
19	Voice of Women is concerned mainly with
20	two assumptions and the values they incorporate. First
21	of all, the assumption that appears to be incorporated
22	in Demand/Supply Plan regarding energy services to
23	Ontario citizens in the future; and secondly, the
24	question of whether at a time when we are striving for

environmental sustainability, a supplier of electricity

1 should be given the long-term task of energy planning. 2 While Ontario Hydro is the major supplier 3 of electricity in the province, it must be remembered 4 that electricity is only one way of providing energy services to consumers. It appears from other opening 5 statements that a number of parties in this hearing 6 7 will address some of those issues. 8 Throughout the Demand/Supply Plan Report, 9 there is a tendency by Ontario Hydro to implicitly 10 interpret future energy needs as demands for more 11 electricity services. That is not surprising to us 12 given that Ontario Hydro is the supplier of 13 electricity, but we submit that the Board must keep 14 this inherent bias structurally built into the system 15 in mind when considering the evidence that is presented 16 by Hydro at this hearing. 17 We also submit that the assumption that future energy services or needs will be supplied by 18 19 electricity is fundamental to the DSP in that the DSP is only as valid as this assumption. 20 21 With respect to the second issue of the 22 proliferation of nuclear weapons, as I have indicated, 23 we will call evidence on that point and we submit this 24 is a matter that under the Environmental Assessment

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Act, given that it concerns the economic, social and

1	cultural life in the community, that this is a matter
2	that the Board should be concerned with.
3	Thank you.
4	THE CHAIRMAN: Thank you, Ms. Spoel.
5	Pollution Probe?
6	OPENING STATEMENT BY MR. KLIPPENSTEIN:
7	I am Klippenstein, initial M, for
8	Pollution Probe. Mr. Chairman, Members of the Board,
9	Pollution Probe is very pleased to be able to
10	participate in this hearing. Pollution Probe is one of
11	Ontario's oldest environmental groups and has a present
12	membership of about 37,000.
13	Over its 22-year history, Pollution Probe
14	has been one of the leading contributors to the
15	environmental discussion in the province. As part of
16	that contribution, Pollution Probe has addressed the
17	issues of electricity generation and electrical
18	efficiency in books and studies, reports, conferences
19	and policy briefs. Pollution Probe hopes that its
20	participation in this hearing will be of assistance to
21	the Board.
22	In this hearing, Pollution Probe will
23	address essentially two specific aspects of the
24	Demand/Supply Plan. And Pollution Probe's submissions
25	will be limited to those two topics

1 Pollution Probe recognizes the importance 2 of other intervenors such as the Coalition of 3 Environmental Groups and will work together with such 4 other intervenors where appropriate. 5 This hearing is about a vision. It is 6 convened to examine Ontario Hydro's vision of the long-term future of Ontario. Pollution Probe intends 7 to present evidence in two areas that will address what 8 9 Pollution Probe submits are two flaws in Hydro's 10 vision. 11 And if I may be permitted to use an 12 analogy, I will suggest that in one case, Hydro 13 demonstrates tunnel vision; and in the other case, we 14 see the acceptance of an illusion. 15 The first issue that Pollution Probe will 16 address is the role of regulations and standards 17 governing the efficiency of electrical and other 18 products. 19 The DSP essentially fails to consider the 20 possibility that future demand for electricity could be further reduced by regulations and standards which 21 22 would have the intention and the effect of increasing 23 the efficiency of the electrical equipment in Ontario's 24 economy. One might say that on this point, Hydro was 25 demonstrating tunnel vision.

1	This issue is part of demand management.
2	It is, therefore, covered by Chapter 7 of the DSP in
3	Panel 4. And consequently, that will be the focus of
4	Pollution Probe's efforts, although it may be addressed
5	where it becomes relevant in other contexts.
6	By way of explanation, there are, at
7	least, four distinct types of mechanisms that can be
8	used in electrical demand management. The first is
9	simply information to consumers.
.0	The second is financial incentives for
.1	the purchase of energy efficient products.
.2	The third would be higher or specialized
.3	rate structures to promote conservation.
. 4	And the fourth would be regulations and
.5	standards to raise energy efficiency of products.
.6	For a number of reasons, Hydro has
.7	selected as its primary mechanisms the first two; has
.8	selected the second as a secondary mechanism; and has
.9	given very low effect to the third.
0.0	The use of regulations and standards has
21	been almost ignored; for example, electric motors
22	account for 75 per cent of electrical use in the
!3	industrial sector and yet, Hydro apparently has
24	neglected or not considered the possibility that
:5	standards governing such motors would have the effect

1	of reducing demand. Pollution Probe hopes to correct
2	this tunnel vision by providing to this panel, for its
3	assistance, expert evidence on the regulations and
4	standards governing electrical and other products in
5	the economy and the potential benefits for substantial
6	reductions in demand using those techniques.
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Those techniques can produce more savings 1 than presently anticipated in the plan; they can often 2 3 do so more cheaply and more effectively than the techniques considered by Hydro. 4 The second issue that Pollution Probe 5 6 will address is the incineration of municipal waste or energy from waste as it is sometimes called. According to the DSP, municipal solid waste facilities offer an 8 9 opportunity to both reduce local landfill requirements 10 and produce electricity. 11 Pollution Probe submits that the appeal 12 of creating electricity from the burning of waste is like an optical illusion. Like such illusions it has 13 14 obvious and immediate appeal but when further 15 information is available, the perception changes. That 16 is Pollution Probe's submission about the position of 17 energy from waste. 18 There are a number of problems with 19 incineration of waste. It creates air emissions. 20 ash that results is in itself an environmental hazard. 21 But there are even more important concerns. 22 incinerators require massive capital expenditures to 23 build. Once built, the incinerators must burn enormous 24 supplies of garbage, and in our submission this is 25 waste in the truest sense of the word since much of

1	that garbage could be reused or recycled. For those
2	reasons Pollution Probe will argue that incineration of
3	waste should not be a part of the DSP.
4	I should note that the provincial
5	government has recently issued a statement to the
6	effect that no further incinerators would be permitted.
7	The relationship between that policy and the DSP is
8	unclear. Until such time as that may be clarified,
9	Pollution Probe will continue to address the DSP as
. 0	presented.
.1	In conclusion, Pollution Probe submits
.2	that Ontario Hydro's vision needs correction.
.3	Pollution Probe hopes to assist this panel to correct
. 4	that vision by providing evidence on the topics of
.5	standard setting for electrical products and on
.6	incineration of waste.
.7	THE CHAIRMAN: Thank you.
.8	Ms. Mackesy?
.9	OPENING STATEMENT BY MS. MACKESY:
0	My name is Florence Mackesy,
1	M-a-c-k-e-s-y. I am part-time party and I am here for
2	myself and on behalf of my brother Jim Cullen who is a
3	participant. He operates a dairy farm about 25 miles
4	southeast of the Bruce Nuclear Power Development. Some
5	of the property is already crossed by lines out of BNPD

1	and this proposal puts the farm at risk again.
2	In the mid-1980s, I was present at much
3	of the hearings into expanding transmission out of
4	BNPD. Yesterday I filed a statement of concerns
5	sorry. Yesterday I filed an opening statement and a
6	preliminary issues list with the Board. And this
7	morning I shall not read the issues list and I will
8	cover parts of the opening statement and add one point.
9	At present, our general position is that
10	new generation and transmission should be built where
11	there is a local demand for more electricity and not
12	built at places such as BNPD which is distant from the
13	areas of need.
14	We are opposed to Ontario Hydro's
15	proposal for expanding the bulk electrical system. The
16	proposal requires the use of large generating stations
17	and of transmission lines that often affect people that
18	don't need more power in their area while at the same
19	time it lets many who use the power escape bearing the
20	impacts of having that want filled.
21	Our interests include one, any aspect of
22	transmission, particularly the negative impacts; two,
23	energy conservation; three, what and where the need is
24	for new generation; and four, building small generation

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25 locally to fill that need.

1	There is one other point I would like to
2	mention. The area between the Bruce Nuclear Power
3	Development and Lake Simcoe has been targetted for a
4	transmission out of BNPD. Because the Board is being
5	asked to approve the targetted transmission areas at
6	this hearing, we are concerned that this hearing has a
7	project specific aspect.
8	Thank you.
9	THE CHAIRMAN: Thank you, Ms. Mackesy.
10	Mr. Hunter?
11	OPENING STATEMENT BY MR. TRIVETT:
12	Good morning, Mr. Chairman, members. I
13	am Wilfrid Trivett, representing Mr. Ron Hunter.
14	In the hope that it will be of some
15	assistance to you, we have prepared a two-minute
16	summary of the main thrust of Mr. Hunter's case
17	touching three or four main points.
18	First, the demand which is articulated in
19	the Ontario Hydro DSP is stated in terms which we
20	believe fails to recognize adequately that it is a peak
21	demand only. That follows that the supply plan is a
22	plan for overdevelopment. Except for the few minutes
23	of some days when the demand is at peak. We plan to
24	show how the peak can be met from a better use of
25	existing plants and in conjunction with modern

technology already used elsewhere.

The second fundamental error of the plan is that Hydro appears unnecessarily preoccupied with megaprojects. We have already heard a great deal about that. These projects impact heavily and adversely upon us and upon what our native friends call Mother Earth.

Three, we intend to establish to your satisfaction that there is an enormous hydroelectric generation potential of existing dams available in southern Ontario close to markets. The DSP is silent on why this resource should not be developed first, at least before proposing enormous dislocation of native peoples and environmental threatening installations.

We intend to establish the development of new power from existing dams where it involves little, if any, environmental concern whether due to flooding, effects to fish stocks, and animal habitat or otherwise because these existing dams have existing established water levels and the environmental effects have been incorporated into our society as it exists.

The fourth, finally, there is the art of pump storage generation which improves the efficiency of the nuclear component and at the same time meets peak demand with clean economy avoiding fossil fuel reliance.

1	Ontario Hydro has ignored this potential
2	resource technology, even though one of their own
3	reports discusses twelve potential sites.
4	Mr. Hunter agrees with all those who have
5	advanced the thesis that much of the Hydro plan is not
6	required and will offer specific economical operational
7	alternatives.
8	Thank you for your attention.
9	THE CHAIRMAN: Thank you, Mr. Trivett.
10	IPPSO, Mr. Shepherd.
11	OPENING STATEMENT BY MR. SHEPHERD:
12	Good morning. My name is Jay Shepherd.
13	Together with Mr. Ian Mondrow I will be representing
14	the Independent Power Producers' Society of Ontario.
15	IPPSO is a nonprofit organization dedicated to the
16	promotion of smaller scale decentralized electrical
17	generation.
18	Its 400-odd members are somewhat
19	schizophrenically divided into two groups: on the one
20	hand the founders, largely individuals,
21	environmentalists, public policy-oriented people, who
22	form the grouped to promote renewable energy and other
23	environmentally attractive-type generation
24	technologies.
25	On the other side, sort of in this corner

1	if you wish, the industry, the many companies, small
2	and large, individuals, community organizations,
3	specialists and others, who together stand ready to
4	deliver on the non-utility generation option. The
5	combination makes for interesting board meetings.
6	You have heard over the last day and half
7	a gratifyingly large number of intervenors tell you
8	that they believe independent power is all or part of
9	the answer to Ontario's electricity supply requirements
10	in the foreseeable future. At least gratifying to me.
11	Even Hydro, the MEA, and AMPCO will tell
12	you that they are supporters of independent power, and
13	it appears that the disagreement between the parties is
14	only over the details and not over the issue or the
15	priority.
16	That leads me, I guess, to the first
17	major theme of our case therefore. Naturally, one of
18	the main rules that IPPSO must take up in these
19	hearings is to help you understand exactly what that
20	independent power option is. Answer the questions
21	associated with it. What are the NUG technologies.
22	How thorougly proven are they? What are their
23	environmental, social and economic implications? How
24	much independent power is available? Can we count on
25	it? How fast can we get it when we need it? Is

1	independent power reliable, the question raised
2	yesterday? How do we make sure that private producers
3	actually produce? Do we need a safety net? If so,
4	what should it be?
5	How does independent power compare with
6	central generation on cost, on reliability, on
7	environmental impacts, on economic impacts, on the
8	flexibility of the system, and many other criteria?
9	And finally, if we are all agreed that
10	this is a wonderful thing, how do we get it? What
11	policies, approaches, structures do we need in place to
12	have this option delivered?
13	What strategies work and which ones
14	don't?
15	In dealing with all of those things, with
16	all aspects of the independent power option as first
17	theme, we will stress a sustainable development
18	approach; unlike some of the speakers in the last
19	couple of days, we don't think that's just a buzz word.
20	We think it is a real vibrant concept that is being
21	proven throughout the world.
22	And sustainable development in the
23	context of energy means an approach in which
24	conservation and independent power form a mutually
25	complementary choice that may - and I stress may - on

1	the evidence be demonstrated to be preferable to the
2	economic risks and the environmental problems
3	associated with central generation.
4	I guess to a certain extent all of that
5	is stating the obvious. You know we are here for that.
6	And to a certain extent you already know what we are
7	going to say about it. What may be less obvious is the
8	second major theme of our case: the problems
9	associated with long-term high stakes planning within
10	the framework of risk and uncertainty.
11	Central to the IPPSO case will be the
12	perhaps self-evident notion that no one, not Ontario
13	Hydro, not this Board, not IPPSO, can be expected to
14	know the future.
15	We will bring evidence to demonstrate
16	that there are techniques for planning in this context.
17	It's not a new problem. We will talk about what those
18	techniques are, how they are applied in similar
19	situations, and how they could be applied here, and we
20	will contrast them, show how they differ from Ontario
21	Hydro's more classic but perhaps also more limited
22	approach.
23	This means talking about different
24	approaches to forecasting. It means talking about
25	choosing options because of their flexibility and

1	valuing that flexibility. It means talking about when
2	you accept risks, when you offload them, and when you
3	simply refuse to accept them at all and exclude the
4	possible options. That then is the second theme of our
5	case: planning in a context of uncertainty. That's
6	all the details. Those two themes to our case you will
7	hear until you are sick of us.
8	More important I think, than either of
9	those things, is the fundamental philosophy behind
10	IPPSO's intervention, a philosophy that will -
11	certainly will as long as I am standing up here -
12	pervade all of our participation.
13	Many parties will remind the Board about
14	the \$200-billion investment decision implicit in the
15	DSP. Many will emphasize jobs or acid rain or nuclear
16	waste and on and on. Those things are all valid.
17	The issues and the sub-issues and the sub
18	sub-issues form a dense forest in which it will be
19	increasingly difficult for us to keep our bearings.
20	We will all be enticed and I don't mean the Board or
21	Hydro or us particularly, but everybody. We will all
22	be enticed and it's quite predictable into
23	disaggregating the problem into a series of manageable
24	debates on particular issues, simply because as human
25	beings it is very difficult for us to consider them in

1	the aggregate.
2	Yet the irony of this is that the
3	aggregate may well be simpler and is certainly more
4	visceral than the issues themselves.
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1	In Janaury 1990, in the first public
2	analysis by anyone of the Demand/Supply Plan, IPPSO
3	wrote what was then and continues to be the essence of
4	its case. I will read it.
5	"Those who will be participating in
6	the public debate, in review of the plan,
7	are not the people who will be most
8	affected by it. We are making a decision
9	over the next three years that will in
10	large measure dictate how our children
11	live. We could, if we make the wrong
12	choices, saddle them with the burdens of
13	enormous debt, costly power, and worst of
14	all, escalating environmental
15	catastrophe. At the other extreme, we
16	could hand to them an economy so crippled
17	by the lack of necessary electricity that
18	it cannot compete in the global
19	marketplace.
20	"Central to our approach to the
21	decision-making process is the
22	realization that we are making the
23	decision as trustees for our children.
24	If we lose sight of that or submerge it
25	in our personal interests, they are the

1	ones who will suffer."
2	Those are our submissions.
3	THE CHAIRMAN: Thank you, Mr. Shepherd.
4	That, I believe, completes all the
5	opening statements.
6	Mr. Campbell, are you ready to proceed
7	with Panel No. 1.
8	MR. B. CAMPBELL: Yes, we are, Mr.
9	Chairman. I will be asking that we take the morning
10	break in time so that we can set up that panel.
11	I thought, perhaps, before doing that, I
12	had noticed that there had been a memorandum circulated
13	with respect to order of cross-examination. I thought
14	before we got into the panel, whether it might not be
15	convenient to deal with those issues and then if we
16	could have a break to set up our panel, we would be
17	ready to go.
18	THE CHAIRMAN: I think that might be a
19	good idea.
20	Order of cross-examination, as I alluded
21	to yesterday, is a bit of a tricky problem because, as
22	many people have said, the positions of the parties are
23	not neatly segregated to follow the traditional lines
24	or even the lines that are prescribed in the Board
25	Rules. I think what we have to bear in mind is that

1	everybody is going to get an opportunity to explore the
2	issues that they feel, and which we feel, are relevant
3	to the determination of the issues.
4	In other words, in a very limited way, if
5	a subsequent cross-examiner raises something that has a
6	profound effect on an earlier cross-examiner, and I
7	have had this in other cases, not as many parties as
8	are here, then there will be an opportunity analagous
9	to rely to deal with that. So that, I would hope,
10	would difuse some of the concerns about order of
11	cross-examination.
12	Obviously, we have to be very careful
13	because these matters could go on forever and we will
14	have to be careful about that, but in general, the
15	general position will be that every proper issue that
16	should be aired on behalf of any party will be.
17	I don't see it as a great problem -
18	perhaps I am a little bit naive about this - I don't

perhaps I am a little bit naive about this - I don't see it as a great problem in the nature of the evidence that we are going to be hearing, certainly in the early stages, but that may turn out not to be so. I don't know. It will be perhaps rash to make that kind of a prediction.

The list that we have here following the Ontario Hydro presentation of its Panel 1 evidence, are

1	the Municipal Electric Association, the Association of
2	Major Power Consumers of Ontario, the North Channel
3	Advocates, the Ontario Natural Gas Association, the
4	Coaltion of Environmental Groups, Northwatch
5	Intervention Coaltion, Ontario Public Health
6	Association, City of Toronto, Consumers' Association of
7	Canada, Energy Probe, Independent Power Producers
8	Society of Ontario, South Bruce Economic Development
9	Corporation, Solar Energy Society of Canada
10	Incorporated, Nishnawbe-Aski Nation and others, Moose
11	River/James Bay Coalition, North Shore Tribal Council
12	and others, Ontario Metis and Aboriginal Association,
L3	Nipigon Aboriginal Peoples Association, Florence
L 4	Mackesy, Pollution Probe, Canadian Voice of Women,
15	Government Ministries and Agencies.
16	Now, first of all, may I ask, are there
17	any other parties other than those that are listed that
.8	propose to cross-examine? Mr. Hunter?
.9	MR. TRIVETT: Yes, we do, Mr. Chairman.
20	THE CHAIRMAN: Thank you.
21	Now, I would propse to put Mr. Hunter in
22	as it was this morning, following Mrs. Mackesy.
!3	Anyone else? Yes, sir?
24	MR. THOMPSON: The Ontario Federation of
!5	Agriculture.

1	THE CHAIRMAN: Yes. We will put the OFA
2	in after the Solar Energy Society of Canada and just
3	before the Nishnawbe-Aski Nation.
4	Any comments on this order?
5	Mr. Poch?
6	SUBMISSION BY MR. D. POCH:
7	Thank you, Mr. Chairman.
8	First of all, on behalf of other counsel
9	I would like to thank Mr. Shepherd for taking the
L 0	initiative on circulating the list, and other counsel
11	who were part of that discussion. We are generally in
.2	agreement with that approach.
13	We all recognize that these orders will
4	change with each panel, both to convenience counsel and
.5	to hopefully reduce duplication.
. 6	The only reservation we would like to
.7	raise is with respect to the position of the government
.8	in that. In our view, the position that the government
.9	will be taking is still somewhat unclear. Our position
20	is that the material on the record is what we should be
21	initially going by. The government review, of course,
2	predates the current government, but the position taken
!3	in that government review, at least by some of the
24	parties represented by counsel for the government
!5	agencies, is quite supportive of Hydro's load forecast.

1 a position that most of us will be opposing, and it seemed to us appropriate that they precede us in that 2 3 circumstance. 4 I would be delighted to hear from 5 government counsel that that's not the case, but that is how we see it at the moment. Otherwise, I think we 6 7 are going to inevitably have to ask the Board's permission to exercise the option you spoke of earlier 8 and I think that could be a waste of time. 9 10 THE CHAIRMAN: First of all, I would just 11 like to say, because it is in Mr. Shepherd's memorandum, that of course this order is not going to 12 13 necessarily be and probably will not be the order that 14 is for other panels. 15 I should hear from Ms. Couban. 16 MR. GREENSPOON: If I could speak in 17 support of Mr. Poch, so Ms. Couban doesn't have to come 18 up twice. 19 THE CHAIRMAN: All right. Thank you. 20 SUBMISSION BY MR. GREENSPOON: 21 My concern is like Mr. Poch's, and I wish to refer specifically to the comments of the Ministry 22 23 of Northern Development and Mines. 24 Our position is that unless the 25 government repudiates the position in the review, that

Т	is their position. And we are very concerned with the
2	comments of the Ministry of Northern Development and
3	Mines, particularly where they say, in relation to
4	sighting of power stations in the review, that:
5	"In addition to the Moose River and
6	other hydraulic sites, the possibility of
7	a major power generating station on the
8	North Channel appears particularly
9	attractive as stimulus to regional
10	economic development."
11	We take issue with that position, and
12	furthermore, we believe that that is not the position
13	of the government; in our talking with the government
14	that appears to be not. That position was not changed,
15	in my submission, yesterday by the government's
16	submissions to this panel in the opening statement.
17	So we have a great deal of difficulty
18	with the stand-offish or the overview posture that the
19	government appears to be taking in saying that they
20	want to cross-examine last. It is our submission that
21	they should either repudiate this review in its
22	entirety or the specific issues that I address,
23	repudiate those issues, or follow the friends of Hydro,
24	the Hydro family, AMPCO and MEA.
25	(laughter)

SUBMISSION BY MS. COUBAN: 2 Thank you, Mr. Chairman. 3 The government agencies which Mr. Moran and I represent are strongly of the view that the 4 5 proponent, the intervenors, the Board, the process and 6 the government itself will greatly benefit from 7 proceeding after the intervenors and before Hydro's 8 reply evidence. I have a number of submissions and a number of reasons for so suggesting that. 9 10 To begin with, and perhaps most 11 importantly, the provincial government has a 12 responsibility, and I would suggest also an obligation, 13 to take into account the views of the intervenors. 14 The role of the government as a party is 15 somewhat unique, its responsibility is ultimately to 16 all the people of Ontario whom the provincial 17 government ultimately serves. It therefore has a 18 responsibility, and as I said, an obligation to take 19 into account a wider interest than many of the other 20 intervenors who in most, if not in all cases, have 21 clients with more particular or specific interests than 22 does the government. 23 The Board has been advised of the many 24 occasions when representatives of the provincial 25 government have referred to the government's strong

1

interest in and hope for a full and frank public debate at these hearings. In fact, I referred to such a comment yesterday in my opening statement, the comment of the Honourable Jenny Carter made to the Legislature on November 28th, 1990.

For the government to publicly state that it has an interest in a full and frank public debate on all the issues before the Board and to then be put in a position that procedurally makes it very difficult for the government to respond to those concerns raised by the intervenors would, in our submission, be most unfortunate.

I would even go as far as to say that it would be unfair to the intervenors and to the public of Ontario who expect the government to listen to the intervenors and to consider those views in formulating their own position on issues.

Secondly, another reason for so ordering the position of the government is that the government is not here to assist Ontario Hydro in making its case to the Board as some intervenors might be of the view.

Only Ontario Hydro can make its case to the Board.

The government does intend to take into account the views of the intervenors who have been funded to the tune of \$26-million. We presume and

1	fully expect that those intervenors will be bringing
2	valuable and thought-provoking information forth. And
3	the government needs to be able to and its mandate of
4	representing the people of Ontario requires it to
5	consider those views.
6	Thirdly, procedurally, it would be my
7	submission, that it would be somewhat cumbersome to
8	allow the government to go last. As I said yesterday,
9	Mr. Moran and I represent approximately 20 different
.0	government
.1	THE CHAIRMAN: Cumbersome to let them go
.2	last, is that what you said?
.3	MS. PATTERSON: You did say that.
.4	MS. COUBAN: I am sorry, to go first,
.5	before the intervenors. Sorry.
6	If the government goes before most, if
7	not all, of the intervenors and the intervenors then
8	raise issues with a witness dealing with the government
9	Ministry policy or activity, we may have to ask the
0	Board for permission to re-examine, to clarify or to
1	correct that point raised during the cross-examination.
2	This is a real possibility of re-examination in our
3	particular case, and I would suggest that that may
4	result and a procedurally cumbersome and time-consuming
5	process for the panel and for all the intervenors.

1	Fourthly, some parties may argue that the
2	government must go early on because the intervenors
3	have to know what the position of the government is.
4	To respond to that argument, I would suggest that the
5	government position is clearly on the public record in
6	a number of forums.
7	Firstly, through government policies and
8	activities, such as the New Energy Directions Policy,
9	the Social Housing Policy, the Government Throne
10	Speech, through the government review and through the
11	government's statements of concerns on different
12	panels. And they will continue to be in the public
13	forum through the development of new government
14	policies and activities which will all be publicly
15	announced, as well as brought to the specific attention
16	of this Board and the intervenors.
17	Fifthly, the Board's own rules of
18	practice and procedure have regulatory agencies going
19	after all those parties in support and in opposition.
20	One can only presume that the Board carefully
21	considered its position in coming to this conclusion
22	and was obviously of the view that such ordering was
23	appropriate.

25 ...

1	Those rules do, however, refer to the
2	regulatory agencies as being neutral.
3	I would suggest that the more persuasive
4	argument for having the ordering of the government las-
5	is that the government's responsibility and obligation
6	to take into account and to consider the views of the
7	intervenors, as I have explained more fully earlier,
8	and to assist the Board in assessing those views in the
9	context of government policy.
10	For all the reasons given and explained,
11	we would strongly urge the Board to allow the
12	government to cross-examine and to present its case
13	after all the intervenors.
14	Thank you.
15	THE CHAIRMAN: Thank you, Ms. Couban.
16	Anyone else who wants to make submissions
L7	on this subject? Mr. Mark?
18	MR. MARK: Mr. Chairman, are we just now
L9	dealing with the question of the order of the
20	government or the order of cross-examination?
21	THE CHAIRMAN: Well, if you have got any
22	more evidence of mosaic, every time everything goes
23	out (Laughter)
24	MR. MARK: I will
25	THE CHAIRMAN: So, if anyone has got

1 anything they want to say about order of 2 cross-examination, this is the time to do it. 3 SUBMISSION BY MR. MARK: 4 Other than the obvious fact that this is 5 not an order which is going to go on for the rest of 6 the hearing, we are very concerned about that, but I 7 think you can surmise my position on that. 8 I have a more immediate concern and that 9 is this: The MEA is at the top of the list for the 10 order for Panel 1. We have planned our affairs with 11 our consultants and whatnot according to the schedule 12 which provides for a Thursday start of 13 cross-examination. 14 I understand from Mr. Campbell through 15 Ms. Formusa yesterday, that in-chief with this panel, 16 it could be four to six hours, which takes us not far 17 into tomorrow. But I am not in a position to get under 18 way until Thursday. 19 If that is your intention, that is fine; 20 otherwise I have a difficulty. THE CHAIRMAN: Well, don't you think you 21 22 might be able to trade with perhaps some of the people 23 close by, review the list, if that was the case? 24 MR. MARK: I am happy to try and work 25 that out and maybe we will advise you after the break.

1	THE CHAIRMAN: I would think that as long
2	as you went ahead of Mr. Poch, there would be really no
3	objection.
4	Would that be a fair comment? (Laughter)
5	So, I think, work it out amongst
6	yourselves as best you can. And if there is any
7	problem, we will have to deal with it.
8	MR. MARK: Okay. Very well. Thank you.
9	Off the record discussion.
L 0	RULING BY THE CHAIRMAN:
11	We are prepared to leave the list as it
.2	now is; that is, the government will stay in its
13	position. That does not mean - I emphasize it - that
4	that will be the permanent place the government will
.5	find itself on cross-examinations. We will have to
.6	deal with each We will try is this way and see how
.7	it works and we will have to reconsider it with each
.8	panel. I think that is the way we can do it.
.9	So now, unless there is anything else
20	prior to the calling of Panel 1, we will take a break.
21	Mr. Campbell, how long do you think you
22	will need before you can get started?
23	MR. B. CAMPBELL: I think if we could
24	have - just to give myself a small margin - if we could
25	have until 11:35.

1	THE CHAIRMAN: That will be fine.
2	MR. B. CAMPBELL: Thank you very much.
3	THE CHAIRMAN: We will adjourn until
4	11:35.
5	THE REGISTRAR: Court recessed until
6	11:35.
7	Recess at 11:10 a.m.
8	On resuming at 11:39 a.m.
9	THE REGISTRAR: This hearing is now in
.0	session.
.1	THE CHAIRMAN: Before we start, I have
.2	one short announcement.
.3	There was a motion by the Friends of
. 4	Kapuskasing that was originally scheduled for April
.5	30th, 1991. That will now be heard on May the 10th.
.6	April 30th was originally scheduled for
.7	scoping for, I believe it is Panel 2, but it is
.8	anticipated the scoping session will be concluded on
.9	April 29th, so that the hearing will proceed on April
20	30th.
21	Mr. Campbell?
22	MR. MARK: Excuse me, Mr. Chairman, just
23	to follow up on the conversation before the break about
24	cross-examination, I have consulted with the other
25	parties who have at least been provisionally been

1	slotted ahead of Mr. Poch, using that as the point of
2	reference, and we have this proposal to offer. Mr.
3	Campbell has no difficulty with you with the
4	proposal.
5	Mr. Rodger on behalf of AMPCO is prepared
6	to proceed first with respect to his cross-examination
7	on economics as distinct from the load forecasting.
8	Mr. Rogers on behalf of ONGA and North
9	Channel Advocates, while he won't be lengthy, he will
.0	be in a position to proceed tomorrow.
.1	So, our suggestion is as follows: That
.2	at the conclusion of Hydro's evidence in-chief, Mr.
.3	Rogers on behalf of his client can cross-examine. Mr.
. 4	Rodger can proceed, and he will likely be able to
.5	conclude tomorrow with his cross-examination on
.6	economics. We would then continue Thursday morning
.7	when the MEA would commence its cross-examination,
.8	complete it in full.
.9	Mr. Rodger on behalf of AMPCO would then
0	return and deal with his cross-examination on the load
1	forecast. And we would then continue in the prescribed
2	order.
3	THE CHAIRMAN: Right. That sounds all
4	right.
5	MR. ROGERS: Mr. Chairman, excuse me. I

1	am Mr. Rogers on behalf of ONGA and my friend got my
2	role wrong. I can't be here tomorrow. It is probably
3	immaterial, but I thought I would just tell you that.
4	THE CHAIRMAN: All right.
5	MR. ROGERS: I will fit my
6	cross-examination in if there is one somewhere and I
7	will work it out with my friends.
8	THE CHAIRMAN: So, what I am hearing is
9	that AMPCO will start off; is that right?.
10	MR. ROGERS: Yes. I think that part is
11	correct. Mr. Rodger on behalf of AMPCO will start off.
12	THE CHAIRMAN: All right.
13	Now Mr. Campbell.
14	MR. B. CAMPBELL: Thank you, Mr.
15	Chairman.
16	Before introducing the panel, there are
17	perhaps some, what I will call, housekeeping matters to
18	deal with. The first is the matter of interrogatories.
19	As you are aware, there was an order made
20	that certain interrogatories be made by certain
21	dates be answered by certain indicates throughout
22	April, the last date being the 22nd, prior to the
23	commencement of the evidence of Panel 1.
24	Despite what I can only describe as
25	enormous effort on behalf of both these witnesses and

1	their staff who are responsible for providing answers
2	to those interrogatories, I can tell you that it has
3	not been possible to get them all done. We have
4	answered over 600 interrogatories and you will be aware
5	that there are multiple parts to almost every
6	interrogatory.
7	We have done
8	THE CHAIRMAN: You talking about Panel 1,
9	are you?
10	MR. B. CAMPBELL: We are talking about
11	Panel 1. I have spoken to, I think, the intervenor
12	where really there are the most number outstanding -
13	and there are perhaps seven or eight there - is the
14	City of Toronto.
15	I have spoken to my friends, Mr.
16	Parkinson and Mr. Poch, and the way we propose to deal
17	with it is that the panel will finalize interrogatory
18	answers over the course of their testimony.
19	If it happens that those few that are
20	outstanding cannot be answered prior to the City of
21	Toronto cross-examination and the answers come later,
22	then we are quite content to have the City of Toronto
23	come back and ask questions that may arise from those
24	particular interrogatory answers.
25	There are some other minor exceptions

1	with respect to the ones that we have been ordered to
2	answer and we are dealing with them on a case-by-case
3	basis. The numbers are not large. We are talking
4	something like we are certainly talking well under
5	20 with respect to the ones that are covered by your -
6	well under 20 - I should be cautious in giving that
7	number.

And I don't anticipate that this will delay or terribly inconvenience anyone. I think it can be worked out with the other counsel, but I thought I should report to you generally on the state of affairs in that matter.

We have continued to get interrogatories which directly arise out of load forecast documents or economic documents that will be spoken to by this panel. Again, the numbers are not large and we are making whatever efforts we can, but obviously interrogatories that have come in over the month of April for this panel we have, in some cases, not been able to provide answers yet. We anticipate doing so.

But those ones, as I say, that have come in most recently with the press of preparing for this appearance, it has not impossible to provide answers to date.

So, unless there are any questions

1	arising out of that, that is generally how $\ensuremath{\mathtt{I}}$ intend to
2	proceed. And I believe that with a very modest amount
3	of good will on all sides, that that will take care of
4	Panel 1 interrogatories. And certainly my
5	conversations with parties are such that that good will
6	is obviously operating.
7	Now, with that matter put aside, I think
8	what I would like to do is raise one more matter before
9	introducing the panel, and that is that we have
.0	received lists from various intervenors of material
.1	which is intended to be used on cross-examination.
.2	To date, we have received lists, I
.3	believe, from the Municipal Electric Association,
.4	AMPCO, the Ontario Public Health Association, IPSSO,
.5	and Florence Mackesy.
.6	If people could provide us with those
.7	lists as soon as possible, it would be terrifically
.8	helpful to the panel. As I say, there are an enormous
.9	number of interrogatories. If particular ones are
0.0	going to be referred to, then I believe, the hearing
1	will proceed much more expeditiously and sensibly if
2	the panel has what in the best of circumstances will
23	only be a modest opportunity to look at them ahead of
:4	time, but at least some opportunity.
!5	So, I would just reiterate the request

that I made last week, that we receive that information
as quickly as possible.

There has also been another development that really arises out of Mr. Shepherd's filing this morning, where it is clear that what has happened here is that a document has been prepared, analyzing a certain aspect of the evidence for which this panel is responsible. It was given to us early this week and we were advised that Mr. Shepherd intends to use this on cross-examination.

I, of course, have no complaint about that. I think it is a very sensible kind of process. If people are going to raise concerns and arguments, then where they are clearly set out and stated, that perhaps can help us move through a more focused discussion of the issues.

It does for us though raise a problem in that if this continues — if this happens, I — certainly in this case, it is fairly close to the appearance of the panel. If it happens during the course of the panel, we are going to need to have the opportunity to speak to our witnesses about the content of this document. This one certainly is more technical than my mathematics allow for and we need to be able to speak to the witnesses and the witnesses to their staff

1	and so on in order to be properly instructed on the
2	matter.
3	So, I meant to speak to my friend Mr.
4	Shepherd on the break about his particular instance but
5	didn't have the opportunity to.
6	Certainly, I expect that that should not
7	be a problem with anyone who is filing such documents.
8	But again, I think it is the kind of question that I
9	want to be clear and on the record that we need that
0	kind of opportunity. And anyone who has any concerns
1	about us doing that should really raise it with us
2	directly, I think in the first instance. And if there
3	is a matter to be brought before the Board, then we
4	will do so.
5	It is my hope that it need not come
6	before the Board, but I want to be clear that we have
7	to have that kind of opportunity for that kind of
8	document.
9	MR. SHEPHERD: Mr. Chairman, we advised
0	Mr. Campbell on Friday that that document was coming
1	which we felt was later than it should have been;
2	although the circumstances made it necessary, we felt
3	it would help everybody. We, indeed, had it faxed to
4	him yesterday morning about 9:30.
5	I have no objection to Mr. Compbellie

1	suggestion that his witnesses should be allowed to talk
2	to their staff, to run computer simulations, whatever
3	they have to do to properly deal with another prefile.
4	That is only fair.
5	I am not sure I understand why, if that
6	were to happen in the middle of cross-examination, the
7	witness needs to be instructed by counsel as to how to
8	deal with it.
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Ţ	I suppose one could hypothesize a set of
2	circumstances but I would think that normally where you
3	are dealing with a prefiled document, counsel is not
4	likely to understand it anyway; certainly I didn't
5	understand ours. And that if the witnesses are able to
6	speak to their staff and their specialists within their
7	staff, that that should suffice.
8	I don't think it is a big deal but I am
9	not sure that a blanket authority for counsel to assist
10	as witnesses during cross-examination may be a good
11	idea or consistent with Mr. Campbell's previous
12	comments on the subject.
13	MR. H. POCH: Mr. Harry Poch, on behalf
14	of the City of Toronto.
15	As you may be aware, in another case
16	before a tribunal there were difficulties that arose
17	because of communications during cross-examination
18	which ultimately led to the application for contempt.
19	I don't have an answer as to how
20	communications during cross-examination should be dealt
21	with, save that this Board in the OWMC hearing has set
22	out a series of guidelines that you may wish to
23	consider; and of course there are the traditional roles
24	of counsel and parties during cross in the civil courts
25	that we could rely upon.

1	I would ask that this Board caution
2	Ontario Hydro as to communications during
3	cross-examination so that we don't run into the same
4	problem that has arisen in the Ontario Waste Management
5	Corporation's case.
6	THE CHAIRMAN: We dealt with this
7	problem. I guess perhaps you were not here last week
8	or ten days ago
9	MR. H. POCH: I apologize.
LO	THE CHAIRMAN: and we discussed it
11	then. And I think this is just a refinement on what we
12	decided. There are distinct differences between this
13	kind of process and the ordinary civil process which
14	would direct one to think that the rule that is very
15	apt in the civil process can be relaxed in the
16	circumstances here. We are dealing with highly
17	technical issues and we are really not dealing with the
.8	traditional kind of credibility that is a common
.9	occurrence in the civil process.
20	I think we will just have to take this
21	again as it comes along. And I think we take Mr.
22	Campbell's point. I would think in most cases if
23	consultation between witness and counsel would have
?4	been appropriate if the document was filed before the
25	hearing, it might still be appropriate during

1	cross-examination. But there may be exception to that
2	and we will deal with it when it comes along.
3	MR. H. POCH: Thank you, Mr. Chairman,
4	and I do apologize.
5	MR. B. CAMPBELL: Thank you, Mr.
6	Chairman. I should tell the Board that we have of
7	course advised the witnesses of the obligations that
8	arise from cross-examination, and we are quite
9	cognizant of them ourselves.
10	But I make no bones about it, some of the
11	technical information I need an explanation of what
12	it's all about in order to advise as to whether we
13	should be raising questions of relevance or
14	materiality, all issues of that type. I do not ask for
15	this for the purposes that are inconsistent with the
16	normal concerns about cross-examination.
17	But I can't give advice to a client if I
18	don't understand the implications of the material and
19	it's really in that sense that I have to be able to
20	deal with it. We are quite cognizant of our
21	obligations as are our witnesses.
22	Now I think then against that background,
23	I will introduce our first panel of witnesses. Sitting
24	closest I must say I began to wonder whether there
25	were times over the period since December '89 when this

1	application was filed that I wondered whether this day
2	would ever come. But indeed it has.
2	And it is my placements into due 6' or

And it is my pleasure to introduce first to you Mr. Mitch Rothman, who is Chief Economist of Ontario Hydro, Head of the Economics and Forecast Division; and Mr. Rothman is sitting closest to the panel.

Sitting in the centre is Mr. Paul Burke, who is Manager of the Load Forecast Department,

Economics and Forecast Division. As the titles might suggest, Mr. Rothman will bear principal responsibility on the economics side of the forecast; Mr. Burke, overall responsibility on the load forecast side of the panel, with the able support of Dr. Lily Buja-Bijunas, who is Load Forecast Supervisor, Economics and Forecast Division again.

Dr. Buja-Bijunas has particular responsibility in the area of the end-use modelling which Ontario Hydro does, and she will be speaking to that area and to certain aspects of matters pertaining to electricity intensity.

I think at this point what I would like to do is have filed and marked as an exhibit Ontario Hydro's entire package of witness statements. As I understand it, those have not yet been given an

	exhibit.
2	If they could be given the next exhibit
3	number, and we could include with them the CV for Dr.
4	Buja-Bijunas, which was distributed previously to
5	parties indicating they wished to cross-examine on this
6	panel. As I say, we would include that CV along with
7	the witness statement which was distributed to all
8	parties on August 24, 1990.
9	THE CHAIRMAN: That will be 98.
10	EXHIBIT NO. 98: Ontario Hydro's complete set of
11	witness statements. Also CV of Dr. Buja-Bijunas.
12	MR. B. CAMPBELL: And I have copies here
13	that should be sufficient for the filing purposes plus
14	a few additional sets. I don't propose to refer to
15	these any further.
16	Now there will be overheads used by this
17	panel and there are two packages of hard copy of
18	overheads that have been distributed to the parties and
19	copies provided to the clerk. I would suggest that we
20	give these two exhibit numbers. The first package is
21	the smaller package and is entitled "Overheads used by
22	Mr. Rothman in his Direct Evidence". Looks like this.
23	And I suggest that it be given the next exhibit number.
24	THE CHAIRMAN: That will be Exhibit 99.
25	

1	EXHIBIT NO. 99: Package entitled "Overheads used by Mr. Rothman in Direct Evidence."
2	
3	MR. B. CAMPBELL: There will be those who
4	say that it is appropriate, but I am not one of them,
5	that the first exhibit to go into three digits is in
6	relation to the overheads for the load forecast. But
7	it is a thicker package, various charts and tables, and
8	if that could be it's entitled "Overheads used by
9	Mr. P. Burke and Dr. L. Buja-Bijunas in Direct
.0	Evidence," and it will be Exhibit 100.
.1	EXHIBIT NO. 100: Package entitled "Overheads Used
. 2	by Mr. P. Burke and Dr. L. Buja-Bijunas in direct evidence".
.3	MR. B. CAMPBELL: The next matter that I
. 4	want to deal with in terms of filings for this panel:
.5	in the course of its direct testimony, the panel will
.6	be referring to various interrogatories. A list of
.7	those was distributed last week. For those who
.8	received that list, they should also have received a
.9	set of those interrogatories.
20	We took a look at this process and said
!1	that the first thing that is going to happen if we send
2	out a list is that the Board staff is going to be
!3	driven crazy because people are going to be phoning up
4	and wanting to get these that Hydro is introducing.
5	Co what we did is we distributed conics

1	of all of those that were on that list. Having done
2	that, we then discovered that in two cases we had sent
3	out previous versions. So for those who got the
4	original package, we have an additional package that if
5	they can see me at the break I will give to them, which
6	replaces two of the interrogatories, and has the two
7	additional ones that are going to be referred to. So
8	if they could see me, we will make sure they have
9	everything.

In the course of going through the direct testimony, we do not anticipate actually turning up the interrogatories and looking at particular parts. We have tried as much as possible to have the presentation flow based on the overheads rather than trying to push documents back and forth. Even on this panel which is perhaps in the end going to be one of the smallest document-oriented panels, there are still a lot of documents. So we have tried, for purposes of direct, to focus in on the overheads.

What we have suggested to Ms. Morrison, and we understand to be acceptable, is that the actual exhibit in relation to interrogatories be the list of interrogatories to be referred to by Ontario Hydro's witnesses in direct evidence for Panel 1. We have drawn up such a list in the order in which they are

1	going to be referred to.
2	We ask that the list be marked an
3	exhibit. We have sets for the Board and for the
4	Board's records of these interrogatories, the complete
5	set with the final version of the two that we did
6	incorrectly and the extra two, and I can give those to
7	your clerk along with copies of this list, and we have
8	copies of the list to distribute to the parties as
9	well.
10	And as I say, I would suggest that the
11	list get the exhibit number and the Board's records can
12	contain a complete package.
13	THE CHAIRMAN: So that will be 101, is
14	it?
15	MR. B. CAMPBELL: It will be 101. Thank
16	you, Mr. Chairman.
17	EXHIBIT NO. 101: List of interrogatories to be
18	referred to by Ontario Hydro's witnesses in direct evidence for Panel 1.
19	Fanel 1.
20	MR. B. CAMPBELL: Now perhaps I can give
21	copies for the clerk. What I have given to the clerk
22	includes not only the list but all of the
23	interrogatories listed in order, and I believe them now
24	to be, in all cases, the revised copies. I would ask
25	Ms. Payne to just distribute the list.

1	Again we are not intending to ask you to
2	turn all these up in the course of the examination in
3	direct in any event. And any of my friends who would
4	like the supplementary, the additional two and the two
5	corrections, if they could see me at the break and
6	there are now one or two extra parties who anticipate
7	cross-examining. We have I believe sufficient copies
8	that we can provide them with this package as well, so
9	that everybody who is cross examining at least has all
10	of the material.
11	MR. D. POCH: Mr. Chairman, I rise and
12	interrupt with some hesitation. I don't wish anything
13	I say to delay the start and I am not objecting to Mr.
14	Campbell proceeding. But I felt it important to put
15	squarely on the record that five minutes ago was the
16	first time we saw that bundle of some perhaps fifty
17	pages of graphics which effectively are the witness
18	statement for this panel.
19	I am hopeful that that won't present a
20	difficulty for us in preparing our cross. I am in a
21	more advantageous position than some of my friends.
22	But I think it would be appropriate to
23	point out that as we will endeavour to file witness
24	statements in advance, which are helpful for people to
25	prepare cross, I would hope in the future that Hydro

1	could be a little more helpful in that regard.
2	MR. B. CAMPBELL: Mr. Chairman, we have
3	always said we would try to respond to, as we have bee
4	requested to, the statements of concerns, all of the
5	various matters made. We have done that. This is not
6	new material. It is drawn from the filings and
7	corresponds directly to the matters we have always
8	indicated we would be covering in this panel.
9	THE CHAIRMAN: Are you saying it is a
.0	distillation of material that is already
.1	MR. B. CAMPBELL: Absolutely, Mr.
.2	Chairman, with the focus on the kinds of issues that
.3	parties have indicated to us over the last week or so
.4	are matters that are of particular interest in this
.5	panel.
.6	The scoping and issues list development
.7	process is something that we have tried to respond to.
.8	I can tell you that the final decisions on precisely
.9	what to include in these and tune into the areas to be
0	covered were still being made yesterday. The process
1	is extremely tight.
2	And we have a choice to make here. Yes,
3	we can do this material further ahead of time if we
4	have a lot more time in this process. But we have bee

careful in the direct testimony to make sure that at

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1	least in our judgment it's responsive to the kinds of
2	issues that are being raised and at the same time is
3	consistent with the material that is being filed, and
4	given the time schedules that we have got here, I can
5	assure you that every effort has been made to be as
6	expeditious as possible. And the panel has worked
7	extraordinarily hard to bring it to this point.
8	THE CHAIRMAN: Is it not a custom you are
9	about to start, I take it, are you, with examination of
10	these witnesses? (Laughter)
11	MR. B. CAMPBELL: I think so.
12	THE CHAIRMAN: I understand it is the
13	custom to swear the witnesses in; is that correct?
14	(Laughter)
15	MR. B. CAMPBELL: Yes, if that's the next
16	item on your agenda, it certainly is on mine.
17	Although I must say that it really the
18	only disappointment about swearing in this panel today
19	was that some many months ago there was a small pool
20	set up amongst the lawyers and people getting ready
21	here for when this event would actually happen. And
22	Mr. Howard and I had opposite ends of this week and it
23	really ticks me off that he wins on my panel.
24	(Laughter)
25	But that said, yes, I would ask that the

1	witnesses be sworn, starting with Mr. Rothman.
2	MITCHELL PIERSON ROTHMAN, PAUL JOHNATHAN BURKE,
3	LILY BUJA-BIJUNAS; Sworn
4	MR. B. CAMPBELL: Mr. Chairman, I propose
5	to proceed directly into my questions of this panel
6	without spending any time at all on qualification
7	questions in accordance with the Board's instructions
8	in that regard.
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or one year, or whatever the short period has been. In our view, a long run forecast has to start with a view of the productive capacity of the economy. That's because in the long run market

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1 economies tend to operate at or near their capacity, 2 their output capacity because they tend to be 3 self-corrected. 4 A further discussion of the reasons for 5 that self-correcting nature of the economies is 6 contained in the responses to Interrogatories 1.14.24 7 and 1.6.38 which have been filed with the package that 8 Mr. Campbell mentioned earlier. 9 But briefly, in a market economy any 10 surplus and any given factor of production will eventually lower its price and lead to its greater 11 12 employment. So that over the long run we do not expect 13 in a market economy long run underutilization of 14 capacity and therefore that the long run forecast has 15 to follow what is likely to happen to capacity in the 16 long run. 17 Our own experience in North American says 18 that that's true. As an example, recent history in 19 Canada, neither the 1981/82 recession nor the 20 subsequent recovery in 1983-89 can merely be reviewed 21 as typical periods. We had a recesssion which is a 22 cyclical downturn in a period of excess capacity 23 followed by an expansion that grew faster then is

decade, 1981 to 1990, as a whole, the total experience

possible in the long run. But if we take the whole

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is not too far from what a trend forecast would have 1 2 looked like in the 70s. 3 So we try very strongly not to have our 4 forecast influenced by whatever the short run cyclical factors are occurring at the time, and not to make the 5 6 mistake of having a long run trend forecast influenced 7 by whatever is happening at some short run period. 8 Now, first I am going to ask you, can 9 you move the mike a little further in front of you, I 10 think it will pick you up better. 11 Now, when you speak to this trend 12 forecast, does that amount to a simple extension of the 13 past? 14 No, it does not. The forecast has to Α. 15 draw from experience, that's the only source of information that we have. But it has to be more than a 16 17 simple extrapolation of past trends. 18 We have to consider what factors were 19 important in the past. We have to have analyze how 20 they have changed in the past and then analyze how we 21 expect them to change in the future. 22 Q. And against that background, could you outline, please, what it is you are forecasting in 23

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process you go through in preparing that forecast?

the economic area and just give a brief overview of the

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1 A. Yes, briefly. The economic forecast 2 is a 25-year macro economic forecast with all of the relevant macro economic indicators, and some micro 3 economic ones as well. Overall activity levels like 4 5 GDP, unemployment rates and inflation rates, we have 6 micro forecasted industrial structure, we even do 7 physical unit forecasts of industrial output for load 8 forecast purposes, we also forecast financial market 9 variables that are relevant to Ontario Hydro like 10 interest rates on long-term bonds, like the exchange 11 rate between the Canadian dollar and especially the 12 U.S. dollar. 13 We forecast energy prices, we publish 14 separately cost escalators which has Ontario Hydro 15 cost-specific forecasts. 16 The long-term outlook itself is issued 17 once a year in the fall with short-term updates primarily for purposes of the Ontario Energy Board, 18 19 published in the winter and in the spring. 20 We start this long-term economic outlook 21 process with a set of open assumption meetings within 22 the division where the analyst responsible for each 23 section of the forecast will present his or her 24 assumptions and have an open discussion among everyone 25 in the division, including myself, on what we think and

- 1 what assumptions we think ought to go into that forecast. From that set of open assumption meetings 2 3 comes a set of preliminary forecasts and preliminary 4 write-ups, they go to me and to a set of external 5 reviewers. At the same time we hold an external review 6 meeting with a dozen or so other experts in the 7 forecasting field drawn from industry, from 8 consultants, from the financial community, from 9 governments. After that review, we finalize a forecast 10 which is sent to the vice-president of corporate 11 planning for approval and present it to the executive 12 office or the executive committee but as an information 13 item, not an approval item. 14 When you speak to the executive 15 committee, that is a committee, I take it, of the 16 senior officers of the corporation? 17 Α. Yes. 18 All right. Now, before turning to 19 highlighting some of the factors considered in making the economic forecast, I think perhaps I will ask you 20 21 to jump right to the end and give us again an overview 22 of the forecast itself, that is the results, what you 23 see in terms of economic activity over the long-term in
 - A. Yes. First let me be clear about

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your most recent forecast.

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which forecast we are presenting and where it comes
from.

We filed two long-term economic forecast documents. The 1988 long-term economic outlook annual review is Exhibit 13, the 1990 is Exhibit 15. I am going to focus on the 1990 outlook because that's what is behind the 1990 load forecast that will also be presented by Mr. Burke shortly after me.

I will refer in a few places to the 1988 outlook because it has more detail on some parts of what I want to talk about. There is also more detail on some factors in the report entitled "The Ontario Long-Term Economic Outlook Background Report on Forecast Details", that was provided in response to Interrogatory 1.9.14 and has been included in the package that Mr. Campbell spoke about earlier.

If we have could have the first chart, the average forecast growth rate, the bottom line is an average forecast growth rate of real economic activity in Ontario of 2.8 per cent per year for the next 25 years.

The chart shows those growth rates in five year blocks. The data come from Exhibit 15. The growth rate slows gradually from a pace of 3 per cent a year in the first decade to two-and-a-half per cent a

- l year, roughly, 2.4 per cent in the last five years.
- 2 That's compared to the 4.2 percentage annual average
- growth rate over the presiding 25 years, 3.9 per cent
- 4 average annual growth rate over the 1980s, including
- both the recession and the recovery. So it forecasts
- 6 relatively modest growth rates compared to both the
- 7 last 25 years and the last 10 years.
- 8 I think we are finished with that chart
- 9 now. Thank you.
- 10 Q. Now, in dealing with that, in
- ll arriving at that forecast, do you see any radical
- 12 breaks with the experience of change in the Ontario
- economy?
- 14 A. The forecast is based on an Ontario
- economic structure that is essentially an evolution of
- 16 the present structure. We don't forecast any radical
- breaks from past patterns of industrial development and
- industrial output in the economy. That doesn't mean we
- 19 assume that all past trends simply continue, that
- 20 whatever way the economy was going in the past, it will
- 21 continue in that direction. We look at the reasons it
- has gone in certain directions in the past and try to
- 23 forecast the future from that.
- 24 The two major determinants of the trend
- 25 rate of growth in any economy are labour force growth

and productivity growth. We identify those as the two major determinants of long-term growth, also in the Demand/Supply Plan Report on page 3-8. It's a simple statement.

If we are going to have more output of goods and services in the economy which is what we measure in gross domestic product, then either we have more people producing it, more people in the labour force, or each one of them produces more, very simple kind of arithmetic.

Clearly productivity is the complex for -- both of those are, complex factors, and I will talk about them in a little while, but to put them together, it makes it a simple way of looking at the way the growth occurs.

Q. I would like to have you deal with these two major drivers that you have spoken of, that is labour force and productivity. I am going to ask you to start first with labour force and deal with that in the context of the demographics, the Ontario population and the implications of that population with respect to labour force in the future.

A. The demographic forecast itself is discussed in more detail in the file document, the Ontario Demographic Forecast 1990-2015, that's filed as

1	Exhibit No. 80. All of the discussion that I am going
2	to now have, the data are taken from that document.
3	We start, of course, with a population
4	forecast to get to the labour force forecast. The
5	demographic or the population forecast is also
6	important by itself for the load forecast because it's
7	where we get our forecast of households from, and
8	number of households is an important determinant of the
9	load forecast, or at least of residential or
10	electricity demand.
11	We have a demographic model of Ontario
12	that has three basic drivers for the population
13	forecast. The first is it fertility rates, the second
14	is mortality rates and the third, immigration rates.
15	From those assumptions the model can then calculate a
16	population forecast.
17	Q. I want you to turn to the first of
18	those, which is fertility rates, and both explain what
19	exactly you mean by that term and indicate what you see
20	happening in that area.
21	A. Fertility rate is the number of
22	children each women bears, on average, over her
23	lifetime.
24	If we could have the next chart we could
25	see that the fertility rate forecast is that it will

stay at about the current level of 1.7 children per
woman. That's below, well below the replacement rate
of 2.1.

The fertility rate is driven by sociological and economic factors. It's been stable now for about ten years, right at 1.7. That is a change from the preceding 30 years or so when, as you can see from the chart, it was moving both up and down with some dramatic speed. So a 10-year period of stability in the fertility rate has been quite a change, and we assume in our forecast that the factors leading to higher fertility rates like the effects of delayed motherhood and better availability of child care will be roughly offset by factors leading to lower fertility rates like higher female labour force participation rates, better education for women, and higher divorce rates.

There has actually been a very slight upward trend in that fertility rate over the last five or six years of this period, but, in essence, we are forecasting that it is going to stay stable at where it's been.

Q. Now, I would ask you, then, to address the second factor you mentioned in the demographic area which is mortality rates, if you could

2 Mortality rates relate to general 3 health of the population, and over the past while 4 mortality rates have been falling slowly for quite a long time. We think that relates to better life 5 styles, more healthful life styles, better nutrition, 6 7 better public health and we expect mortality rates to 8 continue to fall at about their present very gradual 9 rate of decline. 10 The third factor you mentioned was 11 immigration, and I would ask you to deal with that 12 briefly in terms of both in-country migration and 13 immigration. 14 In our forecast net migration from 15 within Canada averages about 12,000 a year, immigration 16 from outside Canada is based on a forecast of 200,000 17 immigrants to Canada from outside Canada per year, with 18 Ontario getting about half of those external 19 immigrants. 20 That forecast is up considerably from the 21 forecast that was made in 1988. We have made a new 22 analysis of Canadian immigration patterns and we have 23 raised our forecast. 24 After we made our forecast, the federal

Minister of Employment and Immigration announced the

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deal with that briefly?

policy target of 250,000 immigrants to Canada a year, 1 2 somewhat higher than our 200,000, although we ° 3 thought -- we had made it, our \$200,000 was a 4 significant increase over the previous forecast. 5 We haven't vet decided whether to 6 incorporate that 250,000 into our long-term demographic 7 forecast, that it was announced as a 5-year target, not a long run target. We still believe that domestic 8 factors will influence the actual rate of immigration 9 10 and we are still considering whether to add that to or 11 population forecast. But, of course, if we were to 12 raise that forecast of immigration, it would raise the 13 population forecast and therefore tend to raise the 14 overall activity forecast. 15 So, our forecast then is that population 16 grows by an average of 1 per cent a year over the 17 forecast period from about 9.7-million, in 1990, to about 12.5-million in the year 2015, with the growth 18 19 rates slowing significantly throughout the period. So 20 in the first five years the population is growing at 21 1.1 per cent a year, by the last five years it's 22 forecast to grow at 8/10ths of a per cent per year. 23 Q. Now, against that population 24 forecast, how do you arrive at your labour force 25 forecast?

1	A. The model itself produces the
2	forecasted population by age group by year and then we
3	amply participation rates to those age groups that are
4	in the labour force. We define everybody above age 15
5	as being in the labour force source population.
6	There is a slight change in that from the
7 .	definition on page 3-9 of the Demand/Supply Plan report
8	which excludes people over 65 from the labour force.
9	As I said, we have applied participation
. 0	rates to to the labour force source population, the
.1	participation rates are forecast by age group and sex,
.2	and if we can see the next chart, it gives us an idea
.3	of what has happened to total labour force
4	participation rates over an historical and forecast
.5	period.
. 6	Male labour force participation rates
.7	have been falling primarily because of earlier
18	retirements among the 55 to 65 age group, and they kind
19	of level off, in fact maybe increase a little bit in
20	the future as social policies change and we have
21	increasing labour force participation rates in the
22	forecast for the age groups of 55 and up for males.
23	The female labour force participation
24	rates have been rising steadily and are forecast to
25	continue to rise throughout the forecast period.

What happens after 2000 to make the total participation rates fall off is that the population is simply aging and moving, there are more and more people moving into the population age categories where participation rates tend to be low, and so we have a gradual fall off in participation rates towards the end of the period.

So we get the labour force forecast by applying the age and sex group participation rates, to the age and sex group population forecast that came from the demographic forecast.

If we look at the next chart, that gives us our labour force population all told, and you can see that the labour force is growing faster than the population until about 2010. There are three factors contributing to that. The labour force source population is growing a little bit faster than the total; we have had continuing increases in female participation rates, and we have a high share of the total population growth coming from immigration and the immigrants tend to be more of labour force age than the the source, the home population.

But the growth rates of both the population and the labour force are expected to slow continously over the period, though the labour force

grows somewhat faster than population, 1.2 per cent
over the forecast period compared to the 1 per cent
population growth rate over the forecast period.
The data on the chart, by the way, of
course, are all from Exhibit 80 as they were for the
labour force participation chart.
The labour force grows in our forecast
from 5.3-million in 1990 to 7.2-million by the year
2015. That's an increase from the 1988 population
forecast of about 3/10ths of a per cent per year, and
the growth rate in the labour force goes from 1.2 per
cent per year in the first five years of the forecast,
down to 6/10ths of a per cent per year in the last five
years, again slightly lower than the population growth
rate forecast in those years, which was at .8 per cent
The slower labour force growth rates are
one of the major reasons for this slower rate of
economic growth in the later years of the forecast.
Q. I want to turn then to some
discussion of the second major factor that you talked
about, that is productivity growth, and I would first
ask you simply to explain briefly how you define a
productivity growth for the purposes of this
discussion.

1	A. Productivity growth is defined as
2	output per worker or productivity, rather, is
3	defined as output per worker and, of course,
4	productivity growth is defined as growth in output per
5	worker.
6	Productivity growth, as I suggested, is a
7	complex relationship. It grows if the technology with
8	which the worker is working changes. It grows simply
9	if the worker gets more capital to work with.
L 0	It will grow as the worker becomes of
11	higher quality, gets more education, more training, is
L2	better able gets more experience simply in the
L3	workplace.
L4	Output per worker would grow if the
L5	system within which the worker is working changes. If
L6	the plant is able to achieve better economies of scale,
L7	for example. And it could grow simply because the
18	worker has better management or the workplace has
19	better management.
20	So, all of those factors can influence
21	productivity.
22	Q. What has been the experience in
23	Ontario with productivity growth?
24	A. Well, we have a table for this one
25	because the experience has been so up and down that I

1	think it is quite interesting to look at a table here.
2	The data here are the from Exhibit 15.
3	We have added some history to the data that are shown
4	in Exhibit 15. We only go back to about '71 in the
5	historical tables there and this goes back to '51.
6	You can see that in the 50s and the 60s
7	there was quite high productivity growth in Ontario,
8	close to 3 per cent per year. That was a period when
9	Ontario was industrializing. It included the period of
10	the auto pact in 1965. It includes the creation of
11	some basic industries in Ontario.
12	But you will also notice that
13	productivity growth almost disappeared in the 70s.
14	And, in fact, from 1972 to 1983 or so, labour
15	productivity actually fell. Labour output per worker
16	in Ontario was less by 1982 than it had been in 1972,
17	ten years earlier.
18	That was due to the high and unstable
19	rates of inflation created, at least, in part by the
20	very high energy price increases brought about by OPEC.
21	to the generally high commodity price increases.
22	It was due in part to the very rapid
23	labour force growth rate that occurred in the 70s, with
24	a number of new and less experienced workers coming in
25	and with labour growing faster than the capital stock

- l could keep up.
- By the 1980s, the productivity growth had
- 3 improved. In fact, in the first two years of the
- 4 1980s, as I suggested, were years of guite low
- 5 productivity growth related, at least, partly to the
- 6 cycle, to the recession of 1981-82, for the decade of
- 7 the recovery, productivity growth was 2.3 per cent per
- 8 year in the 80s.
- 9 So, although that chart suggests that
- 10 productivity growth -- or the table suggests that
- 11 productivity growth in the 80s was only 1.9 per cent,
- 12 it really was closer -- that recovery era was not very
- far from the very strong growth rate of the average of
- 14 the 50s and 60s.
- Q. And how do you see that rate
- developing in the future?
- 17 A. Well, we certainly don't expect to
- 18 see the 70s repeat themselves. The factors that
- created the 70s don't appear likely to recur. We
- 20 certainly won't get the kind of labour force growth
- 21 that we did before, with the entry of many new and less
- 22 experienced workers. We expect to see the capital keep
- 23 up with the labour force.
- 24 We don't expect to see the kinds of
- 25 lengthy and severe shocks that the OPEC energy price

1 increases created for the economy. 2 So, our forecast is in line with, but just above, the average experience of the whole past 25 3 4 vears. 5 We don't see the 1950 to 70 repeated either. Ontario is industrialized. Many of these 6 7 industries are now mature and we think there is some 8 possibility of future environmental regulations that 9 could negatively affect productivity growth. 10 In fact, our LISA model that I will talk 11 about later, capitals L-I-S-A, looks at productivity as a result of capital technology and labour quality and 12 the interaction among them. 13 14 It would produce a forecast of about 2 15 per cent average productivity growth for 25 years and 16 we have, for the reasons I have stated, we think that productivity growth won't be that great and we have 17 18 made a forecast of productivity growth averaging around 1-1/2 per cent for the next 25 years, just above the 19 20 average of the preceding 25 years. 21 Q. All right. What does that translate 22 to in terms of the pattern for the future? You have 23 given sort of an overall. 24 What do you see as the pattern for the 25 future?

1 A. Our forecast is that productivity 2 growth accelerates as we get out into the future. And 3 remember, that we are measuring productivity here by 4 output per worker. And remember also that labour force growth is forecast to be quite slow as we get into the 5 6 later part of this century and into the beginning of 7 the next century. 8 So, with fewer new workers, we expect 9 that each worker would be equipped with better and more 10 capital. We expect each worker will train him or 11 herself better or will be trained by his or her 12 employer better. 13 And so we would expect those factors to lead to higher output per worker as we get farther on 14 15 into the forecast period. 16 I am finished with the chart. Thank you. 17 Q. All right. I want to turn then to 18 another area that you mentioned earlier on, which is 19 the kinds of shifts that are happening in the Ontario 20 economy. And I would ask you generally to address what 21 you see in terms of Ontario's industrial structure over 22 the forecast period. 23 A. Okay. This discussion follows some of the detail that is found in Exhibit 13 as opposed to 24

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Exhibit 15.

	when we talk about industrial structure,
2	one very gross way to break it out, a very aggregate
3	way to break it out, is goods-producing versus
4	service-producing industries. That is a classification
5	that is heard often.
6	Goods-producing industries include the
7	primary industries, manufacturing industries,
8	construction and utilities.
9	Primary industries, in turn, include
10	agriculture, forestry and mining.
11	The service-producing industries include
12	wholesale and retail trade, finance insurance and real
13	estate, transportation and communications, government
14	and business and personal services, the latter of which
15	includes health care.
16	The pattern over a pretty long period of
17	time has been a shift in aggregate away from '
18	goods-producing industries. That doesn't mean that the
19	goods-producing industries' output is declining, but
20	their share of the total has been declining over quite
21	a long period of time.
22	But what has been happening within that
23	is that manufacturing hasn't been declining. It
24	doesn't have much trend, while the share of the primary
25	sector has been falling sharply.

1	Transportation and communication
2	services, finance insurance and real estate and
3	business and personal are the services industries that
4	have each been increasing their share moderately.
5	The next chart lets us analyse the past.
6	The data on this chart are from Exhibit 15. I have
7	added again some history that isn't in Exhibit 15 to
8	this chart and I have also added some annual detail
9	that isn't in Exhibit 15. It only gives five-year
10	intervals, but I have added the intermediate years.
11	It gives five-year intervals for the forecast. It
12	gives annuals for the history.
13	What you can see happening in that is a
14	clear downward trend, but as I said, most of what is
15	happening within that is that the primary industries
16	are falling, especially agriculture as a share of
17	output.
18	There has been an increase in
19	transportation and communication that is in keeping
20	with the increasing importance of communication within
21	a globally aware economy.
22	There is an increase in the finance
23	insurance and real estate sector that represents a
24	shift to services generally.
25	The increase in the business and personal

service sector is due to a number of factors: One is 1 2 that with more two income families, there is just a 3 generally greater demand for services to households. 4 Another is that as income rises, there is a bit of a tendency to saturate goods' consumption and 5 people start to turn to services more; only so many 6 refrigerators you can buy, and once you have got enough 7 8 of them, you may decide to travel. 9 And finally, within the industrial 10 sector, many large industrial firms have started to 11 move to outsourcing some of the services that they buy. So, that instead of having design work done internally, 12 13 they have it done externally; or copying done 14 internally, they have it done externally. 15 That doesn't change the activity or the 16 nature of it. It just changes the way that it gets 17 categorized as occurring within a manufacturing

industry or occurring within a manuracturing

industry or occurring within a service-producing

industry.

Q. And what do you see happening in this

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Q. And what do you see happening in this area in the future?

A. I don't think we can expect the kinds of shifts that have taken place there to continue at the same rate as they have in the past. We do expect them to continue.

1	So, we expect continued growth in
2	transportation and communication. We don't expect the
3	business and personal services to grow as rapidly as
4	they have in the past.
5	But what we do expect is continued
6	stability in the manufacturing share. This chart gives
7	manufacturing share as a percentage of total Ontario
8	GDP. Like the previous chart, its data is from Exhibit
9	15, plus annual detail in the forecast that is not in
10	Exhibit 15.
11	The chart doesn't go back before 1971
12	because the data don't go Statistics Canada has not
13	published these data before 1971.
14	But this chart really emphasizes that
15	there has been no trend over the last 20 years in the
16	share of manufacturing in Ontario's total output. It
17	hasn't risen consistently; it hasn't fallen
18	consistently.
19	Our forecast is for a slight rise over
20	the short term followed by a very slight declining
21	trend. It is really pretty stable in the forecast,
22	just as it has been pretty stable in the history.
23	We still expect relative growth in
24	services against goods but at a slower pace than in the
25	last 20 years.

1	Q. And I take it that in this
2	manufacturing area, you do try to look at some of the
3	details of what is going on in that sector.
4	A. Yes, we do. The load forecast in
5	particular uses detailed information on manufacturing
6	industries, especially needs it for electricity
7	intensive industries.
8	There is further information on the
9	specific detail for the industrial end-use forecast.
10	It is contained in the Physical Unit Forecast Report
11	that was filed with Interrogatory 1.9.48.
12	There have been significant changes in
13	share within the manufacturing sector. What is
14	primarily happening within the manufacturing sector has
15	been that some industries, especially resource base
16	industries like pulp and paper and primary metals, have
17	been losing shares significantly; while other
18	industries, like chemicals or electrical machinery and
19	equipment and especially transportation equipment which
20	includes automobile manufacturing, have been gaining
21	share quite rapidly.
22	Our forecast is that these share shifts
23	will level out somewhat and that industries like pulp
24	and paper and primary metals will continue to lose
25	share but at a slower rate than they have in the past

1	Now, part of that is that although these
2	industries have been losing share in the past, it
3	doesn't mean that their output has been falling, just
4	that it has been growing at a pretty slow steady rate.
5	And we essentially forecast that to continue.
6	Those industries will have their output
7	grow at a pretty slow steady rate; while the industries
8	that had been relatively fast growing, like
9	automobiles, chemicals, become a little more mature and
10	don't grow quite as rapidly as they had in the past.
11	I just want to note that our forecast in
12	this area does take into account some increased
13	recycling in the pulp and paper industry.
14	Q. All right. And I would like you then
15	briefly to deal in the economic area with how your
16	forecast compares to other forecasts that are available
17	in this area.
18	A. We regularly survey other
19	forecasters, other economic forecasters. Only one of
20	them, Informetrica, regularly publishes long-run
21	Ontario forecasts. They public a forecast at 2010.
22	Their long-run forecast at the time of
23	our last long-run forecast was for average real
24	economic growth in Ontario of 2.7 per cent to the year
25	2010. That compares to our forecast of 2.8 per cent to

1 the year 2015. We are pretty close. 2 THE CHAIRMAN: When was their last 3 forecast? 4 MR. ROTHMAN: Pardon? 5 THE CHAIRMAN: When was their last 6 forecast? 7 MR. ROTHMAN: Their last forecast --8 THE CHAIRMAN: I believe you said the 9 last forecast you had. 10 MR. ROTHMAN: But that was the forecast 11 that was made at the same time as the forecast I am 12 presenting. 13 THE CHAIRMAN: Which year was that? When 14 was it done? 15 MR. ROTHMAN: They would have done it about June 1990. 16 17 THE CHAIRMAN: I see. 18 MR. ROTHMAN: And I am talking about our 19 forecast published in September of 1990. 20 In May 1990, we surveyed what Ontario 21 forecasters were available for their growth rates from 22 1990 to 2010 and we found a band of 2.1 to 3.3 per cent 23 annual growth for them, with a median growth rate of 24 2.8 per cent. So, our forecasts are well within the 25 range of the forecasts that others made for similar

periods.

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2 MR. B. CAMPBELL: Q. Now, in 3 'recommending that forecast, I gather that you and your 4 group have made a judgment assisted by some modelling 5 efforts that you mentioned earlier, and I think you 6 referred to LISA, which I understand to be a model of 7 the Ontario economy.

> Perhaps you could just briefly deal with the development and use of that model and the exercise of your judgment in recommending a forecast.

MR. ROTHMAN: A. The model that we use for the Ontario economy is called LISA, which stands for long-term impact and simulation analysis, and it is our long-term econometric model of Ontario. It was developed from some previous econometric models that we had in Ontario Hydro.

One of the most important features of LISA is that it has been designed from the beginning as a long-term multi-equation econometric model of the Ontario economy. That is unique. As far as I know, it is the only such model in existence.

Q. And as I understand it, it is fairly new. Perhaps you could just give some picture of the period over the years in which it was developed and how and when it has been used.

1	A. Yes, Mr. Campbell. Thank you.
2	We started developing LISA in 1989, as I
3	said, from using an evolution from previous models.
4	And we first used it for the 1990 economic forecast.
5	We designed LISA so that it would be
6	driven by the long range factors that I have talked
7	about; the labour force, demographics and productivity,
8	all of which influence potential output.
9	The potential output in LISA is based on
10	its production function. The production function is
11	based on these long-range factors: Labour, capital and
12	technology.
13	We have also included energy prices in
14	LISA because they have proved to have had significant
15	consequences for economic growth in the past, as I
16	talked about the consequences that energy prices had in
17	the 1970s.
18	The model also has some features that
19	allow flexibility in the interaction of the inputs and
20	allows the empirical evidence allows the history to
21	determine the nature of the interaction among those
22	factors.
23	And we haven't had obviously much
24	experience with this model. It is hard to say that
25	this long-term model is performing quite accurately

- when the only forecast we have of it is one-year old or less than one-year old.
- 3 But the model performed well in its construction and has performed well by the usual 4 5 methods of measuring model quality; the statistical tests for the goodness of fit for each equation. The 6 7 usual test of any econometric model is to take the history and split it up and you derive the model from a 8 9 part of the history and then see how well the model forecasts the rest of the history, using the part of 10 11 the history that you -- using only the history that you 12 had started with. And this model did well on that

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It also performed well in the usual statistical tests for the model as a whole and on the basis of the way it -- how much judgment it needs to make it run.

Typically, economic or econometric models require some kinds of explicit judgment to make this one go, to make it go. This one primarily requires explicit judgment to get it started, to get its initial forecast lined up with what we know of history. And then once that is done, we can let it go.

As I said earlier, when we did that, we got a slightly higher growth than we expected and for a

7	number of reasons we brought that down a little bit.
2	But basically, we have trusted the LISA model's
3	forecast for the September 1990 long-term economy
4	outlook.
5	MR. B. CAMPBELL: Mr. Chairman, this is a
6	point at which we will be turning to another kind of
7	section in the testimony.
8	I will be continuing with Mr. Rothman,
9	but given that it is relatively close to 1:00, rather
10	than break in the middle, I would prefer if we could do
11	the lunch break now.
12	THE CHAIRMAN: We will adjourn until
13	2:15.
14	MR. CAMPBELL: Thank you.
15	THE REGISTRAR: This hearing will adjourn
16	until 2:15.
17	Luncheon recess at 12:50 p.m.
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1 ---On resuming at 2:17 p.m. 2 THE REGISTRAR: This hearing is again in 3 session. Please be seated. 4 THE CHAIRMAN: Mr. Rothman, I know it is 5 hard - this is an unfamiliar process - but if you could 6 just try and speak a little slower; even the 7 professionally-trained reporters are having some 8 difficulty getting down everything that you say. And 9 as I say, I know it's hard, but if you could just try 10 and speak a little slower. Thank you. 11 MR. B. CAMPBELL: If you hadn't said 12 anything, I was going to say - and will take the 13 opportunity to say - that Mr. Rothman has been called 14 as a witness by myself on many occasions, five or six 15 that immediately come to mind. There hasn't been an 16 occasion when he hasn't been told before he starts, 17 during the course of his testimony, after he leaves to 18 learn it for next time, given that very message, and it 19 always distresses me how little he takes from past 20 experience. 21 THE CHAIRMAN: Well, it's very hard to 22 break embedded habits. MR. B. CAMPBELL: Q. Now Mr. Rothman, I 23

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am going to ask you to address something that of course

always gives lawyers heart attacks to call it this way,

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- but it's what I gather you call risks to the forecast.
- 2 And I am going to give the Board the explanation that I
- 3 always get when I say, 'What are we talking about this
- 4 risk stuff for?' It's that, I take it, when you say
- 5 risks to the forecast, you are talking about in both
- 6 directions?
- 7 MR. ROTHMAN: A. Yes.
- Q. This is not just one direction?
- 9 A. Yes.
- 10 Q. And there are three risks to the
- forecast that I want you to address. And I am speaking
- here of the economic forecasts. And I think the three
- 13 that I would like you to address have to do with
- 14 changes being or risks to the forecast arising from
- trends in environmental regulation, increased
- environmental regulation; second having to do with
- 17 political circumstances; and the third has to do with
- whether the agenda for the economy associated with the
- 19 current federal government will be as successful as
- 20 that government from time to time hopes.
- 21 And I would like you to address each of
- 22 those in turn starting first just briefly with risks to
- 23 the economic forecast related to environmental
- 24 regulation.
- A. Well, first I want to comment about

1 this issue of speed. (Laughter) 2 0. I didn't ask you that question. 3 This is another problem that he 4 always has with me, is that I keep answering questions he didn't ask. 5 6 And that's just to say I have heard both 7 you, Mr. Chairman, and you, Mr. Campbell, and will try to make things easier for the court reporters. We are 8 9 interested in having a brief hearing, but I recognize 10 that having the witnesses just talk more quickly isn't 11 going to do it, so ... 12 In the issue of environmental regulation, 13 we have incorporated into our forecast both in the way 14 that our forecast takes account of past trends and 15 judgmentally some increase in environmental regulations 16 over what is now here. 17 So, the risk to the forecast would be that of future environmental regulations that 18 19 constitute a significant break from the past trend. 20 We would expect that such a break would 21 be in the direction of tighter regulation, though there 22 is some possibility, of course, of less tight regulation. But I would expect that to be small. 23 24 Any break in the direction of tighter

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regulation would be likely to reduce the measured level

1	of economic activity because it would require
2	manufacturers, service producers, economic actors to
3	use resources that don't produce goods and services
4	that would be counted in the measured gross domestic
5	product. That doesn't mean of course they wouldn't
6	produce anything useful; they would produce a better
7	environment. But it wouldn't be counted in the gross
8	domestic product as it is now measured.
9	Q. I take it that again the effect or
10	do you see any effect of that in terms of how it could
11	translate into the kind of forecast that your
12	department is responsible for generally?
13	A. Yes. That would of course translate
14	into a lower - if there were such a break in
15	environmental regulation trends - that would translate
16	into a lower level of economic activity then is
17	currently in the forecast.
18	Q. Now how does sustainable development
19	fit into this description of risks to the forecast
20	arising from environmental matters?
21	A. The sustainable development concept
22	says this generation should not meet its needs in a way
23	which impairs the ability of future generations to meet
24	their needs. That's a fairly generally stated concept.

It can be translated into policies and implemented in a

1 wide variety of ways. For one example, the current 2 Federal Green Plan says upfront it's committed to 3 sustainable development principles. 4 Even implementation of the Green Plan as 5 stated isn't yet clear enough to be so that we can 6 analyse it in terms of defined policies. So that one 7 of our economic advisors, one of our forecast advisors, Informetrica, is working on that and economic impact of 8 9 the Green Plan. But in order to do that, they're 10 having to consult with senior officials in Ottawa to be able to define the implications of the Green Plan in 11 12 terms of policies clearly enough to simulate it. 13 So, given that this impact can be -- that 14 the impact of the Green Plan, of sustainable 15 development would require, would depend -- sorry, let

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The impact of the Green Plan or sustainable development policies is going to depend on how they are implemented and that there is such a wide variety of ways in which they can be implemented,

me start again. See, I think better when I'm talking

So, we haven't put anything like that into the forecast partly for that reason: that it is

difficult at this point.

making some quantified analysis of its impact is very

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1	so difficult now to quantify. We also haven't seen a
2	government commitment to that kind of radical break
3	from past trends in environmental regulation that a
4	sustainable development commitment might imply.
5	And even if they were to make such a
6	commitment again, it isn't clear that they would make
7	radical break from past trends. So at this point we

don't have sustainable development in the forecast, we 8 9 haven't quantified the impact it might have on the 10

economy, but we see it as a risk.

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If there were a significant commitment to sustainable development and if that met a significant break with past trends in environmental regulation, then there could be a significant impact on the economy. The direction of that impact would most likely be negative on measured GDP growth. There was some further discussion of this issue of sustainable development in the responses to Interrogatories 1.6.62 and 1.6.63.

Q. The second area I want you to address is political risks to the forecast and perhaps you could address the matters you want to cover there.

There are political risks to any forecast, short or long term, but especially long-term forecasts because changes in government policies can

1 change long-run performance of an economy guite 2 readily. 3 We look at the Thatcher government in 4 England for example as an example of a government whose 5 policy changes clearly influenced the course of the economy in that country. Or look at the economies of 6 7 Eastern Europe, compare East and West Germany to see 8 how much difference a government's policies can have in 9 economic development over a sustained period of time. 10 That's an extreme example of course but it is clear 11 that government policies can affect the long-run 12 performance as well as the short-run performance of an 13 economy. 14 I have already discussed one possible set 15 of policy changes in the environmental area. 16 I gather there are two then, two in 17 the political area I would like you to address. The 18 first of those is Quebec separation. 19 Quebec separation is a topical -- a 20 subject of a lot of topical interest right now. Whether or not there is separation, we would think 21 22 there would be likely to be some devolution of powers from the federal government to the provincial 23 24 government, some decentralization of all of Canada.

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Again, it's hard to predict what those

1	consequences would be because we don't know what the
2	circumstances are. We could model various scenarios
3	and again various of our advisors, our forecast
4	suppliers are doing such modelling, but haven't
5	completed it.
6	There could be positives or negatives for
7	it in Quebec separation economically for Ontario. For
8	example, it's possible that Ontario would get more
9	people, more internal immigrants from the rest of
10	Canada in the event of a Quebec separation. If there
11	were say as many as 200,000 which is an estimate of the
12	number that came after the election of the Parti
13	Quebecois government, that would be an increase in the
14	population of about 2 per cent, a little under 2 per
15	cent.
16	And it could therefore produce a
17	corresponding increase in the total level of economic
18	activity in Ontario by producing a corresponding
19	increase in the labour force.
20	Somes aspects of decentralization could
21	be positive for the economy by reducing the total
22	resources the government uses by reducing overlap in
23	the provision of some government services. Some kinds
24	of cultural and social effects could be neutral,

changes in those policies.

1	The big negative would be the potential -
2	negatives - would be the potential for a change in the
3	way in the size of the market that Ontario can serve
4	leading to a generally smaller market for Ontario.
5	The change in the Canadian financial
6	market making Ontario's position, or Toronto's
7	position, as the financial centre of Canada less
8	important. A smaller Canadian government as a result
9	or a government that would move out of Ontario. Those
10	could all have negative impacts.
11	Q. Those are the kinds of things that
12	you would see as possibly arriving in a full separation
13	kind of situation?
14	A. Yes, most of those in a full
15	separation situation.
16	Q. I take it that other considerations
17	there might relate to things like the federal debt?
18	A. Well, we wouldn't know how the
19	federal debt might get divided and we could have a
20	disproportionate burden or a less than proportionate
21	burden of the federal debt after a separation.
22	Over the short run, there is likely to be
23	a negative effect whatever happens in the long run.
24	That negative effect would come from the affect on
25	interest and exchange rates as the international

1	markets react to the uncertainty about what the
2	structure of Canada ultimately will be.
3	Markets don't like uncertainties. And if
4	Canada is viewed as uncertain, then Canadian borrowers
5	will be having to pay a premium. That's a negative
6	effect. We would expect that to disappear once the
7	situation were resolved either way. Once the situation
8	is well defined, those negatives, that negative effect
9	would be likely to disappear.
10	So to summarize. There is a real
11	possibility of a significant negative effect from the
12	real change in the economic structure of Canada that
13	would come with a complete separation. There is a
14	chance of some positive effect from a separation or
15	from devolution of powers. And there is a chance of
16	relatively neutral effect if, for example, there were
17	to continue to be a full economic and monetary union
18	with Quebec and trade union with Quebec, there might be
19	less of an impact on the economic structure of Ontario
20	as a result of such a change.
21	Q. I want you to turn then to
22	considerations in this area relating to monetary
23	policy, what risks you see arising in this area.
24	A. The other kind of risk from a

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government policy would be a change in the government's

1	approach to the management of the economy. I don't see
2	much risk of a change in the government's fiscal policy
3	stance. There is not much room for further
4	expansionism given the size of the current deficits.
5	So it seems to me that the risk that
6	arises from the change in central government management
7	of the economy is in the monetary policy area.
8	We assume that the Bank of Canada will
9	continue to try to keep inflation low in Canada and the
10	risk therefore would be a loser monetary policy and in
11	particular, most especially, a monetary policy that
12	vacillates between being too loose and too restrictive.
13	That again causes variance in prices, uncertainty in
14	the economy, and uncertainty tends to have negative
15	effects on the economy.
16	So, we see some possibility of a move
17	from a stable tight monetary policy to a looser or more
18	particularly vacillating monetary policy as a negative
19	risk for the Canadian economy.
20	We also see the possibility that the
21	current high interest rates and high Canadian dollar
22	could result in businesses that would otherwise have
23	located in Canada not coming to Canada, and that could
24	be a longer term negative effect.

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Q. I want to turn then to, in the final

area of risk, to this whole area of the economic agenda, if you will, of the current federal government, how it has been implemented over time, and any risks that you see arising out of how successful those policies are in achieving their stated objectives. This conservative government surveyed Α. business and said: What kinds of things can we do to make Canada more competitive? And they got an agenda from that. They also got an agenda from the Macdonald

Commission which had been initiated by the preceding

liberal government.

That agenda included a number of significant policy changes. It included getting rid of the National Energy Program, weakening the scope of the Foreign Investment Review Agency, FIRA, allowing greater freedom for foreign capital to come into Canada, deregulation of some major sectors of the economy like the transportation and communication sectors, reducing government ownership of some key corporations that are effectively within the business sector, especially in the transportation sector, negotiating a Free Trade Agreement with the United States, reforming the unemployment system, reforming the tax system, especially removing the manufacturers' sales tax.

1 Well, they have implemented a very large 2 chunk of that agenda, virtually all of that agenda, and 3 expected to get from that a significant improvement in 4 Canadian competitiveness. 5 We have done a study of the impact of one 6 piece of that agenda, the sales tax reform, and that 7 was provided with the response to Interrogatory 1.7.3. And I'll talk in a minute about the impact of the Free 8 9 Trade Agreement. 10 But, despite all of that, Canada's 11 competitiveness is now worse than it was when the 12 government started that agenda. We see that, I see 13 that as primarily a result not of the failure of the 14 agenda but of the consequences to Canada, the Canadian 15 dollar and interest rates, of the restrictive monetary 16 policy that I talked about earlier. 17 That policy is aimed at producing long-term low inflation rates though. If it succeeds, 18 19 then interest rates in Canada can fall, the Canadian 20 dollar can adjust its value closer to one that will 21 make it competitive, and Canada could be in guite a 22 good competitive situation relative to where it would

So, in this success scenario with deregulated economy keeping costs low in Canada, with

have been before or relative to where it is now.

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the Free Trade Agreement keeping competitive juices

flowing in Canada, and productivity increasing with

access to the U.S. market allowing the economies of

scale to be exploited by Canadian manufacturing

industries, we could have significantly stronger growth

than is currently in the forecast.

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- Q. I want to turn then from some of these risks that you have talked about to deal in particular with and briefly with what you see as the impact of the Free Trade Agreement, what it has been, where you see it going on economic growth and perhaps just indicate where your thinking is with respect to the possibility of the inclusion of Mexico in the North America Free Trade area.
- A. We did an analysis, as I said, of the impact of the Free Trade Agreement. The report of that study was provided with response to Interrogatory

 1.6.47.

That study predicted that the Free Trade Agreement would cause some adjustment problems in its first years with a negative impact on GDP growth in 1990 and '91, but it would ultimately provide 11 years of worth of GDP growth in the first ten years. That was due to increased Canadian productivity and access to larger markets given the economies of scale.

1	As I suggested, we haven't necessarily
2	seen those impacts yet because of the effective high
3	interest in rates and high values of the Canadian
4	dollar, but I still think the Free Trade Agreement is a
5	positive force and its good effects may take longer
6	than we expected but will come.
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1	We haven't done any analysis of the
2	possible effects of a North American Free Trade
3	Agreement including Mexico, we can't do that without
4	knowing more about what an agreement might contain.
5	There hasn't been any discussion at all yet of what
6	might be in it.
7	We would think that the direct effects of
8	such an agreement would be small. Canada's trade with
9	Mexico was only about \$2.3-billion now, as compared to
10	170-billion or so trade with the U.S. So the direct
11	effect would be small, the indirect effect on Canada's
12	trade with the U.S. might not be small. We just
13	wouldn't know until we know more about what an
14	agreement might look like.
1.5	Q. Now, I want to leave the general
16	economic forecast area and ask you to speak briefly to
17	another area that you produce forecasts in, and that is
18	financial market forecasts, and in particular, I would
19	like to you address interest rates.
20	A. Our interest rate forecast is used
21	inside Hydro in two ways: to calculate the corporate
22	financial discount rate, which is used for internal
23	decision-making, and to help set the financing
24	strategy.
25	We forecast real interest rates first and

1 then forecast nominal interest rates given our forecast 2 of inflation. 3 Our forecast - if we could have the 4 chart - is for real interest rates to stay high for 5 some time, relative to the historical levels, but to 6 start to fall in the mid-1990s. This chart shows data 7 from Exhibit 15, again with some additional history 8 added to the data that are in that exhibit. 9 The forecast of interest rates, real 10 interest rates, staying relatively high is based on 11 some research that we have done on the causes of interest rate movement. The papers from that research 12 13 on which we have primarily relied were provided in 14 response to Interrogatory 1.2.11. 15 We first made that forecast of relatively 16 high real interest rates at a time when most forecasts were lower but other forecasts have now come up. 17 18 If we look at the history over the last 19

If we look at the history over the last 20 years, real interest rates were first very low and then got very high mostly because people underestimated inflation and then have compensated for the risk of future higher inflation by demanding higher real returns. We think that world demand for capital will stay very high in the next few years because of the need for capital in eastern European and the move of

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1		Kuwait from a supplier to a consumer of capital, and
2		that's going to keep interest rates high for the next
3		five years or so.
4		After 2000 interest rates tend to
5		moderate as the baby boomers move into the high savings
6		years. And our forecast is that the average real
7	P	short-term interest rate on instruments like treasury
8		bills could fall to about 3 per cent by 2005 or so from
9		the 5-1/2 that it was in the mid-1980s.
10		Q. I want to turn then from that area to
11		the kinds of fuel price forecasts that you are
12		responsible for, and I suppose the first one we should
13		perhaps talk about is your forecast of electricity
L 4		prices.
L5		A. The Economics and Forecast Division
L 6		has to produce a load forecast, to produce a load
17		forecast we need a forecast of electricity prices. We
18		don't forecast electricity prices ourselves, there is a
L9		corporate financial planning and reporting division
20		that projects Ontario Hydro costs from cost data that
21		it gets.
22		There have been times when those
23		projections implied falling real prices for
24		electricity. If we are going to produce a most likely
25		load forecast, we have to use a likely electricity

price forecast and we did not believe that falling real prices for electricity were likely. We therefore used a forecast of constant real electricity prices.

Currently the price projections from that group are more realistic and we have used them for the load forecast. In the numbers used for the 1990 load forecast, prices for electricity rise in real terms for the next 5 years then stay roughly stable for 12 years and then rise again, reaching of level of about in 2015, about 24 per cent above those in 1990 in real terms. Those price increases are based both on known cost increases and expections of future costs which may not be known in detail.

Q. The other energy price that, as I understand it, is important to you is your expectations with respect to the price of natural gas, and perhaps you could briefly deal with your expectations there.

A. The economic outlooks that I have already mentioned, Exhibits 13 and 15, have information on our forecast of energy prices and there is more detail in the Energy Price Trends Report and its predacessor report, the Retail Energy Price Trends Report, we filed two issues of those as Exhibit 12 and 14. In those you will find forecasts for a lot of different energy forms. The one I will talk about here

is natural gas because I think it is most relevant. 1 2 The one I am talking about here is from Exhibit 14. 3 Natural gas is also important as a 4 potential generation fuel. We take account in that 5 forecast of the expected gas demand and the expected cost of finding gas. So we look at both supply and 6 demand factors though without a formal single 7 8 statistical model. 9 The forecast is a multi-step process that 10 combines analysis of end-use market competition with 11 analysis of expected trends of demand and supply. There is more detail on that process description in the 12 response to Interrogatory 1.2'4.27. 13 14 The forecast has to be compatible, as I 15 have said, with both supply and demand factors in the opinion of the analyst. 16 17 Q. Perhaps you could just outline for us 18 as you did for electricity briefly what you actually 19 see happening by way of gas prices? 20 A. We expect real natural gas prices to 21 be increasing throughout the 1990s, the wholesale price 22

be increasing throughout the 1990s, the wholesale price at Toronto is forecast to rise to \$5.54 in 1990 dollars by 2015 up from a price of \$2.58 in 1990 dollars in 1990. We expect strong increases in the demand for natural gas. It's a versatile fuel that can be used

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for a lot of new things. Most importantly, for

gas-fired electricity generation but also for

transportation uses and a number of other new uses, it

has several advantages, especially in generation. It's

cleaner than coal, it can get in-service faster than a

nuclear energy could, and adapt easily to cogeneration.

So we would expect a significant increase in the amount

of gas-fired generation in the United States as well as

in Canada and that creates higher demand for Canadian

natural gas. If you have got more demand, you need to

look farther and harder to get more gas and the finding

costs and development costs go up and that leads to an

increase in the real price of the natural gas.

Our forecast, this forecast of increasing real prices has been essentially unchanged for the last two years and is well within the range of other forecasts of natural gas prices.

Q. Now, the final item I want you to address briefly before I turn to the load forecast section of this testimony is to outline your division's responsibility for cost escalators. Perhaps you could briefly explain what they are and your responsibilities there are, what you have produced?

A. The cost escalators are a series of cost indexes for very Hydro-specific instruction or

activities, like building transmission lines or
operating generating stations. Each escalator is a
custom-built escalator. We compile a basket of goods
and services which you need to have to do that activity
and then we weight them, we weight each of the items in
the basket by their share of the cost.

To give you a concrete example, to build a transmission line, among other things you need insulators, you need steel to build a tower, you need aluminum for the cable, and we put each of those in the basket, along with everything else that goes into the tower in proportion to their share of the total cost. So, for example, tower steel is 42 per cent of the cost of a transmission line, so it gets a 42 per cent weight. Then we get forecasts of the escalation rates, the inflation rate for steel, and we give that inflation rate a 42 per cent weight, everything else gets whatever its weight is in the construction cost of a transmission line, and we get, from that, an escalation rate for the total activity.

We get the forecasts of the particular price increases to the extent that we can from an industrial cost model that an outside supplier, DRI, gives us, we adjust that model for our own forecast of inflation and then use it to produce the inflation

- 1 rates for the specific cost indices, and then we add up 2 all those cost weighted increases and calculate the 3 escalator for each of our cost escalation series. 4 Q. Now, Mr. Burke, I want to turn to 5 you. 6 DR. CONNELL: Mr. Campbell, I wonder if I 7 might intrude before you leave Mr. Rothman and address 8 one or two questions to him. 9 MR. B. CAMPBELL: Certainly. 10 DR. CONNELL: Really under the general 11 heading of your risk factors, you did refer to trade, 12 particularly the North American Free Trade context. I 13 wonder if you could envisage the impact of larger 14 perturbations on the global scene, for example, 15 successful breakthrough on the Uruguay round or the reverse of that, a trend to much more restrictive trade 16 17 attitudes. 18 MR. ROTHMAN: We haven't looked at that 19 directly as it was to the forecast. 20 I think that there is some risk to Canada 21 of a reversion to a mercantilist approach within the 22 world, that is retreating to trading blocks, a European 23 trading block, an Asian trading block, and an American 24 trading block.
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Canada has significant trade relations

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Т	with each of those blocks. Canada is a significant
2	trading nation, and it seems to me that any threat to
3	the openness of world trade would be a threat to
4	Canada.
5	Certainly within a context of that kind,
6	a complete failure of the Uruguay round, the
7	Canada/U.S. relationship would become even more
8	important under the Free Trade Agreement and we would
9	then be much more vulnerable to whatever the economic
10	fortune of the United States was than we have in the
11	past.
12	So it's hard to say which direction that
13	goes, whether it's a positive risk or a negative one,
14	but I would think in general it's negative. It gives
15	Canada fewer options and that would have to be
16	negative.
17	DR. CONNELL: You mentioned your
18	expectation that fiscal policy would be stable at least
19	in the near term, but even within that constraint, I
20	presume there is some latitude for change in tax
21	policy. At least one prominent party is committed to
22	dismantling the GST, for example, what if that tax
23	burden were shifted over to income tax, is that a
24	significant perturbation for your forecasts?
25	MR. ROTHMAN: We saw a real positive

1	effect of removing the manufacturer's sales tax which
2	was clearly a detrimental tax for goods production in
3	Canada, it clearly favoured goods production outside of
4	Canada over other goods production in Canada. If that
5	were moved to an income tax, if the burden were moved
6	to an income tax, I would think it would pose some
7	danger to continued inflow of capital in Canada but I
8	have couldn't analyze at what level.
9	I think it might have some potential for
10	negative impact.
11	One of the reasons I didn't mention it,
12	but one reason for forecasting slower - a deceleration
13	in this shift to goods producing - sorry, the shift to
14	service producing industries was that shift of taxation
15	away from goods and including both goods and services.
16	So, I think you would get some net impact as well
17	perhaps.
18	DR. CONNELL: You didn't mention
19	behaviour of Canadian consumers, but do you see the
20	balance between spending and saving as being a
21	significant factor?
22	MR. ROTHMAN: We see the Canadian savings
23	rates as improving later on as the baby boomers get
24	into the higher savings years a little later.

Canadian savings rates have stayed higher

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1	than those in the onited states, and I expect them to
2	continue to do so. I don't see a significant threat of
3	a big shift in savings patterns in Canada towards much
4	more spending than there has been in the past.
5	A big shift towards much more spending
6	would probably be negative because it would make less
7	funds available for investment in Canada.
8	DR. CONNELL: Thank you.
9	MR. B. CAMPBELL: Whenever you ask me a
10	question, you give one of these wretched hypotheticals,
11	about which I warned the panel, and I don't know why
12	Mitch got to escape but I suppose I shouldn't fully
13	complain about it. (Laughter)
14	Q. I will turn then to you, Mr. Burke,
15	and ask you just to confirm that the main documents for
16	purposes of the load forecast, 1990 load forecast and
17	supporting documents are Exhibits 9, 10, 16, 17, 18,
18	77, which represent Hydro's current view of the
19	long-term demand for electricity in Ontario, and these
20	cover various aspects of the forecasting process, and I
21	take it do represent your latest thinking on this
22	matter.
23	MR. BURKE: A. They do.
24	Q. All right. I am first going to ask

you to describe the overall approach you take to

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1	forecasting	the	load	and	the	objectives	that	you	have
2	in preparing	the	long	g-ter	m lo	ad forecast			

A. The basic load forecast is the start of demand/supply planning for Ontario Hydro. We present it as a bandwidth to recognize the high degree of uncertainty there is in planning so far in the future.

It's in the nature of forecasting, though, that neither the medium forecast nor the range forecast can be proven to be absolutely right or wrong.

What we can do is we can perform a thorough analysis of the information available to us and we can try to use appropriate and reasonable methodology to draw inferences about the future.

Hydro uses econometric and end-use models and these are always being developed and improved in their current form we think they are state-of-the-art for Ontario. With their help we make judgments about the basic load forecast which we think are informed and balanced and we think that the basic load forecast is a suitable basis for planning, the mix of demand side and supply side resources, that are required to provide reliable electricity services to Ontario for the next 25 years.

Q. I want to take you into some of the Farr & Associates Reporting, Inc.

- 1 elements of that forecast but I first I want to deal a 2 little bit with some terminology. The first thing I 3 would ask you to explain is what your basic load 4 forecast is aimed at? 5 The basic load forecast is the amount 6 of electricity that Ontario Hydro would have to either generateor purchase in order to meet the requirements 7 8 of its customers in Ontario without taking into account 9 the actions taken by Ontario Hydro itself to alter the level and timing of demand at the customer level. 10 11 Essentially, the basic load forecast is the sort of load forecast we would have prepared if we 12 were not offering demand management programs. 13 14 It includes ongoing efficiency 15
 - It includes ongoing efficiency improvements, it recognizes shifts in market shares, and it takes into account changes in use that are associated rising incomes.

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Government regulations that affect electricity use such as appliance standards and building codes are taken into account in the basic load forecast. They are not attributed to Ontario Hydro's actions although we may advocate the use of standards and in fact even the extension of standards. But effectively they are treated as part of the basic load forecast and as a government policy matter.

1	Q. There is one element that you spoke
2	of with respect to the basic load forecast, you
3	indicated that it did not include the effect of Hydro's
4	own demand management programs, I take it that it also
5	does not include the perhaps you could just explain
6	how it deals with load displacement non-utility
7	generation.
8	A. Okay. Load displacement non-utility
9	generation programs are also not included in the basic
10	load forecast to the extent that Ontario Hydro provides
11	financial incentives to encourage incremental load
12	displacement by non-utility generators.
13	Q. I take it that it is in those two
14	areas that you see the difference between the basic and
15	the primary load forecast? Perhaps you could just
16	explain that.
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1 That's correct. The primary load forecast is derived simply by subtracting out the net 2 banc load Wime, the basic load forecast of Ontario Hydro's for electrical efficiency improvement, load · lord dis placements and load displacement non-utility generation. We prepare the forecasts of these program arefully to try to make sure that the demand s are net of effects would not otherwise -at the demand reductions would not otherwise red; that is, we make sure that the forecasts 11 of the demand reductions in the efficiency improvement 12

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of the demand reductions in the efficiency improvement programs and load displacement non-utility generation are not already captured by the basic load forecast itself.

Q. All right. Now, before moving on here, there are three aspects of this distinction that I want to address for a moment. And the first one is how the treatment of information programs has evolved as between the basic and primary forecast. These are the kinds of information programs, the kind of programs that Pollution Probe referred to this morning in its opening statement.

A. The intent of the terms basic and primary load has remained the same since the material we filed before the Demand/Supply Plan, but there has

- been a change in the way information programs are
 treated.
- At the time in about 1988 or so when the

 Demand/Supply Plan was being written, we made a hard

 distinction between information-driven programs whose

 impact was included in the basic load forecast and

 incentive-driven programs whose impact was included in

the primary load forecast.

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- 9 Q. All right. Incentive-driven are ones
 10 where Hydro actually pays an incentive to someone in
 11 the course of encouraging that person to make some
 12 savings of some type or another?
 - A. Yes. There is the financial transaction between Ontario Hydro and its customer.

The reason we did that was the nature of information-driven programs, such as advertising and billing stuffers, is such that it is really difficult to estimate the impact of these on load; and it was considered that the most reasonable way to forecast their effects was to extrapolate from the previous experience Hydro had had with such programs.

However, as time has gone on, Hydro has started to offer much more customized information, such as audits and consulting studies to its customers.

This sort of information is of such value in some cases

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- that this may cause customers to make choices that they

 otherwise would not have made. And essentially, one

 could not say that that effect was captured in the

 basic load forecast.
- 5 So, in order to be able to take this sort 6 of much more specific information program into account, 7 that is a program that may not make a financial transaction to the customer but which does convey value 8 9 to the customer in the form of the information received, we have included effects of that sort of 10 11 program in the electrical efficiency improvement 12 numbers that we are now calculating. And this is the 13 approach we have taken in the '89 and 1990 load 14 forecasts.

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To reflect this broader classification of electrical efficiency improvement programs, we now speak of the difference between the basic and primary as regards to electricity efficiency improvement programs as the net load impact of program-driven electrical efficiency improvement; again, not making a distinction between information now and cash incentives.

Q. All right. Now, the second aspect of this distinction between basic and primary that I would like you to address is the implication that this has

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- 1 when you are making it with respect to analysis of rate structure change in the forecasts; that is, you have 2 got your basic and your primary. 3
- How do you deal with that rate structure 4 5 impact, making that distinction as you look out into 6 the future?
- A. The electricity prices that are used 7 8 in the basic load forecast follow the rate structure 9 that was in place in Ontario until 1989. That was an average cost-based rate structure. 10

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However, at the beginning of 1989, Ontario Hydro started to phase in a time-of-use rate structure still based on accounting costs as recommended by the Ontario Energy Board back in 1979.

The objective of the new time-of-use rate structure is to shift load from on-peak hours to off-peak hours and effectively, we treat it as a demand management program.

The impacts of all the rate structure changes associated with implementing time-of-use rates are included in our load shifting forecast as part of the adjustment we make to the basic in order to derive the primary load forecast.

O. All right. Now, the third area that I would like you to address, the third aspect of this

- distinction between the basic and the forecast, is the implications of this distinction on the data that you use over time in the course of preparing the basic load forecast.

A. Prior to 1989, that is, prior to the time that electrical efficiency improvement programs and load shifting programs and load displacement non-utility generation programs were introduced by Ontario Hydro, there effectively was no difference between what we now call basic and primary load in terms of historical data.

It is only these demand management programs themselves that have driven a wedge between the load that is observed at the generator and the load that the customers originally place on the system.

To prepare historical data now for the basic load itself, we have to derive it from the observed load at the generator, which is the primary load, by adding back to the primary load the cumulative impact of demand management programs to date; that is in this case since 1989.

In preparing our 1990 load forecasts, we have done this for the first time; that is, taking into account the estimated impact of the demand reductions achieved through programs in 1989 as the way we

1 estimated what 1989 basic load was for forecasting 2 purposes. Q. All right. I want to turn then to 3 both -- some discussion of the short term, I think, 4 5 before we get to the long-term forecast. Anyone who has reviewed the documents will note that you partition 6 7 your forecasts into two periods, short-term and long-term. Perhaps you could just explain the use of 8 9 that terminology, where the break off is. 10 A. Hydro defines its short-term load 11 forecast as the the current year plus five years. has traditionally been the time frame for which 12 13 operational planning is done at Ontario Hydro and over 14 which we analyse rate structure and rate setting in some detail. 15 16 The 1990 short-term load forecast was 17 actually prepared in July of 1990 and it covers the 18 period 1990 through to 1995. And the long term 19 forecast then starts in 1996 and goes to 2015. 20 One of the important aspects of this is 21 that the long-term model results are attuned to the 22 load levels in the last year of the short-term load 23 forecast. 24 And so, in the 1990 load forecast, both 25 the end-use and econometric projections start from the

1 same 1995 base year load level. 2 The methodologies we use for the 3 short-term basic load forecast differ from those for the long-term. That is because we have very different 5 user needs in that short-term period and a need for much more disaggregation in various ways. But also 6 because there are data limitations that restrict some 7 8 of the modelling that we can do in a short term. 9 The 1990 short-term load forecast is described in Exhibit 9 and the models we used are 10 outlined in Appendix 2 to that document. 11 12 Q. All right. Now, your evidence is 13 going to concentrate on the long-term basic load 14 forecast, but as there was an update to the July 1990 15 short-term forecast, that update was made in January of 16 1991. 17 I would ask you to explain just briefly 18 the reasons for the short-term update and more 19 importantly, whether this has had an impact on the 20 long-term forecast currently before the Board. 21 The short-term load forecast that was Α. 22 made in July 1990 was revised down in January, 1991, to 23 take into account the weak load growth that was 24 experienced in the second half of 1990 and because 25 - there was a downward revision to the Ontario GDP

1 forecast for 1991 and subsequent years. This overhead shows the extent of the 2 3 revision to Ontario GDP. By 1997, Ontario GDP is 4 pretty well back on its original track as of the 5 September outlook. 6 Q. All right. Now I am going to try to 7 be a little more rigorous than I was with Mr. Rothman's 8 overhead in referring to these. This is page 1 of 9 Exhibit 100 that you are referring to, I take it? That's correct. 10 Α. 11 Perhaps you could just speak to that. 0. 12 Okay. Well, really, the only point I Α. want to make is the extent of the revision to GDP. 13 14 Ontario Hydro estimates that Ontario GDP fell nearly 1 15 per cent in Ontario in 1990. The load fell .9 per cent 16 last year on a weather-corrected basis. 17 Though it is estimated that if we had not 18 had the major strikes in Ontario in the fall of 1990, 19 load would have been roughly the same in 1990 on a weather-corrected basis as it was in 1989. However, 20 21 the forecast that we prepared in July 1990 for 1990 22 itself was for 1.2 per cent growth. 23 The update to the forecast which is on 24 page 2 of the exhibit compares -- this shows both the 25 original 1990 load forecast and the update prepared in

1	January and indicates that primary energy demand is
2	about 2.6 per cent lower in 1991 and about 4 per cent
3	lower in 1992 than it was in the original 1990 load
4	forecast.
5	These numbers have been filed in respons
6	to interrogatory 1.30.3 and in precise terms, they are
7	given on page 3 of the overhead package. And this
8	shows that the 1992 change is the largest of the
9	changes in the short-term period and that by the time
10	you get to 1996, you are very close, in fact, to the
11	original load forecast path.
12	And it turns out that in 1997, both
13	Ontario GDP and the load forecast return to the long
14	term paths that were contained in the 1990 long-term
15	load forecast filed before this Board.
16	This reflects the view that we have that
17	it is the long-term perspective that should govern the
18	forecast and not the cyclical ups and downs of the
19	economy. Essentially, we are focusing on long-term
20	fundamentals in the forecast before you.
21	Q. All right. Now, is this kind of
22	short-term update usual?
23	A. Well, we certainly make updates when
24	the circumstances warrant but we are not surprised to
25	be making an update now. It is very difficult for

anyone to forecast the precise timing and extent of
economic downturns; that a downturn sorry, that a
downward correction was inevitable was apparent from
the GDP growth that prevailed in Ontario in the period
1982 to 1989.

Growth averaged about 6 per cent per annum in that seven-year period which was well above the potential growth for the province that we would analyse in using the sort of approach that Mr. Rothman described for you this morning. Essentially, the potential growth for Ontario in the 1980s was about 4 per cent.

And, in fact, the average growth for the 1980s in Ontario was just under 4 per cent when you roll in the values for the early years of the decade, 1980 to '82, which were, in fact, very weak years in Ontario.

During the period that GDP was booming, load also grew very quickly. It grew at about a 5 per cent annual rate from 1982 to 1989; however, again on a decade average basis, load grew at a more modest rate; that is, about 3.8 per cent.

When we look ahead to the 1990s on the basis of potential growth in Ontario, we would estimate that potential growth for the economy would be about 1

1 per cent slower than it was in the 1980s; that is, 2 instead of about 4 per cent, something around 3 per 3 cent. 4 And similarly, that the 1 per cent 5 reduction in GDP potential would translate into a 6 roughly 1 per cent reduction in load growth on average 7 for the 1990s. 8 Effectively, this is what we have done in 9 preparing the update to the forecast. This forecast 10 averages less than 3 per cent for the 1990s and it does 11 so by having weak load growth in the early part of the 12 1990s, load growth that is faster than 3 per cent in 13 the mid 1990s and by the end of the 1990s, it returns 14 to load growth rates that are slower than 3 per cent. 15 By fixing firmly on these long-term fundamentals rather than changing a 25-year forecast on 16 17 the basis of the last six months' events, we are trying to learn a few forecasting lessons from the early 1980s 18 19 and what happens subsequently. 20 DR. CONNELL: Just before you take that 21 overhead off, could I just query one number? 22 In the terawatthour column, the third 23 number down, that should be the difference between the 24 numbers for January and July? 25 MR. BURKE: They are correct.

1 MR. CAMPBELL: O. I think the dates are the date on which the forecast was made: is that 2 3 correct? 4 DR. CONNELL: It is not the date. It is 5 just the difference --MR. BURKE: No. You are quite correct, 6 7 that the value there should be 5.4 instead of 4.6. 8 DR. CONNELL: Thank you. 9 MR. CAMPBELL: Q. Mr. Burke, maybe for the purposes of the transcript, you can just describe 10 11 that precise number under the column so that people who 12 are trying to follow this in the transcript can find 13 this easily. MR. BURKE: A. Okay. Under 1993 under 14 the change in terawatt/hours, the difference should be 15 minus 5.4 and that would work out to a difference of 16 minus 3-1/2 per cent, not minus 3 per cent. 17 18 Thank you. All right. 0. A. As Mr. Rothman points out, I should 19 check that, in fact, that the terawatthour numbers are 20 21 correct and not the difference, which is incorrect, but 22 subject to that, those changes are as we said. Q. Now, if I can just have a moment. 23 I want to turn your attention then to the 24 25 longer-term forecast and again ask you briefly to

- outline the external and internal process that is
 conducted during the preparation of the long-term
 forecast.
- A. The long-term forecast is prepared in the fall of each year and is presented to an external load forecast advisory committee at a day-long meeting that is typically held in early November.

That external load forecast advisory

committee includes representatives of the Ministry of

Energy of Ontario, the Federal Department of Energy,

Mines and Resources, the National Energy Board, Quebec

Hydro, several major oil and gas companies, the major

economic consulting firms and an academic or two.

Having received the comments from this group, we take them into account and a few weeks later present the forecast for internal review by a committee of directors; and it subsequently is presented to the executive office for approval to submit to the Board of Directors who ultimately approve the forecast at their December meeting.

Q. All right. Now, the forecast that you will be speaking to in the material relate to both peak load and energy, and I would ask you to explain those terms and explain why load forecasters tend to concentrate on energy data in the modelling that you

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2	A. Models of electricity demand almost
3	universally attempt to explain energy consumption
4	rather than the peak rate of consumption for some
5	period like a month or a year.
6	This is because economic activity in a
7	given time interval is closely related to the overall
8	energy demand in that interval rather than simply the
9	demand associated with the one-hour period that sets
.0	the peak for the month or year.
.1	Ontario Hydro has focused its load
.2	modelling activities largely on energy demand.
.3	Q. I take it though that you do prepare
.4	peak load forecasts and how do you go about that
.5	translation process?
.6	A. Well, once we have prepared the
.7	energy forecast, we can convert it into a peak load
.8	forecast using a load factor.
.9	A load factor is simply the ratio of the
20	average load in a particular time interval to the peak
21	load in that time interval.
22	We arrive at our forecast of total system
23	load factor in two stages: We look at the short-term
24	load factor and then we make an assumption for the long

term.

	ror the short-term road ractor, trends
2	are analysed for each and every one of the customers
3	that Ontario Hydro sells power to. We wholesale to
4	about 350 municipal utilities, about 120 direct
5	industrial customers and we divide our retail system
6	into about 50 area offices.
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1	And for each of these roughly 500
2	customers, an analysis of trends in load factor is
3	carried out. Effectively the load factor can change
4	because of the trend in the individual customer's load
5	factor or because of the mix in load factor sorry,
6	the mix in customers themselves on the system.
7	In the long term, the system load factor
8	for the basic load forecast is held constant at the
9	value attained in the last year of the short-term load
10	forecast.
11	Now this overhead here shows the history
12	for the load factor for 20-minute peak, that is annual
13	peak, for the Ontario Hydro system since 1950. You can
14	see that in the 1950s the load factor seemed fairly
15	stable. In the 60s it ramped up considerly. And from
16	the early 1970s to the present, it has been fluctuating
17	fairly widely, but in fact from a statistical basis

Now I should remind you that with load shifting under time-of-use rates, the load factor of the primary load forecast does change, and it increases because of the effect of reducing peak and increasing

there is no trend since the early 1970s in the load

factor. And it's this experience of the last twenty

years or so that we are basing our projection of

long-term constant load factor on.

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energy in off-peak -- in shifting the load into

off-peak hours.

Q. Against that background of load
factor short-term models I'm finally going to ask you
to turn to the long-term models and describe the kinds
of models that you use to forecast energy demand in
Ontario over that longer term period.

A. As I mentioned right at the beginning, we use two kinds of models econometric and end-use models. Both are driven by the same set of forecast information for economic activity and energy prices, although as I will describe both models use this information at different levels of aggregation.

Both models focus on the same definition of sectors, that is, residential, commercial, and industrial. These are end-use consumption categories, and I want to make the distinction here because it sometimes is confusing between these sectors and our customer classes.

Ontario Hydro sells to, as I mentioned actually just a minute ago, municipal utilities, direct industrial customers, and the retail system. These are our three customer classes. And in fact within the municipal utilities they sell to residential customer classes, general customer classes, and large users.

1	None of these are what we are dealing
2	with. We are dealing with residential, industrial,
3	commercial as defined in the market reference data set
4	which I believe is filed as Exhibit 80 before the
5	Board.
6	Now, the way these models translate
7	economic information into expected future levels of
8	electricity demand is what really distinguishes them in
9	practice.
10	Q. And one of the types of models you
11	use is econometric. How was an econometric model used
12	for forecasting?
13	A. Well, an econometric model applies
14	statistical analysis to time series data of past
15	energy-consuming behaviour to draw inferences about the
16	relationships between electric load, econometric
17	activity, and energy prices in our case for each
18	sector.
19	These relationships are assumed to hold
20	in future four forecasting purposes, but that does not
21	necessarily result in load forecasts that replicate the
22	past. That really depends on the actual nature of the
23	empirical estimates empirical relationships that we
24	estimate and on the forecasts of the explanatory

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variables that drive the models.

1	Q. That's your overall econometric
2	approach. How do you go about using what's called an
3	end-use model for forecasting? What's the difference
4	in approach there?
5	A. End-use models structure information
6	about the end-uses of electricity and energy in general
7	in a systematic and comprehensive way. Within each of
8	the sectors I have mentioned, there are many end-uses,
9	some of which provide heating, cooling, lighting
10	services.
11	Unfortunately there is no official
12	historical time series data available for this detail
13	level of end-use information. Increasingly over the
14	last ten or fifteen years, numerous surveys have been
15	done to try to gather information about the end-use
16	composition of Ontario.
17	This cross sectional data set includes
18	valuable insights about the way energy is used and
19	these insights may be projected into the future as
20	well.
21	However, in practice to make those
22	projections into the future, trends are based on expert
23	opinion or analysis performed outside the end-use
24	modelling system itself. There isn't the historical
25 .	track record to use for statistical analysis as in the

1 econometric model -- the time series data anyway. 2 The systems that Ontario Hydro now uses 3 were developed by EPRI, that's an acronym for E-P-R-I 4 for the Electric Power Research Institute, which is 5 located in Palo Alto, California. 6 And these models contain some behavioural 7 equations which enable these models to take into 8 account the impact of energy prices and GDP and income 9 effects within the model. The primary focus 10 nonetheless remains on trying to assist the future of 11 individual end-uses and aggregating them up to get a 12 total system forecast. 13 Q. And what do you see as the major 14 strengths of each model type in contributing to your 15 judgment about the forecast? 16 A. Both model types capture electricity intensity changes due to shifts in composition of the 17 18 sectors in the Ontario economy. But because of their 19 greater detail, end-use models are much better able to reflect compositional shifts within the sectors than 20 21 the econometric models are. As I mentioned, the 22 econometric models are data limited effectively from 23 going below the sector level in Ontario. The greater detail of end-use models 24

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permits known technology trends to be reflected in the

1	forecasts of specific end-uses. And this is very
2	useful.
3	On the other hand, an econometric model
4	may be better able to capture the overall impact of new
5	technologies and new uses of electricity within its
6	forecast.
7	End-use models must focus on
8	well-established uses for which data are available.
9	And invariably in the analysis of each sector there is
10	a category left over effectively which receives various
11	names like "other" and "miscellaneous" for which much
12	less information is known, and which is therefore much
13	more controversial to forecast.
14	But it is in this other category that new
15	technologies start. And certainly ten years ago it
16	would have been in the other category to find things
17	like office equipment, personal computers, and so on.
18	These were very small loads ten years ago and have
19	grown very rapidly since.
20	The econometric model because it is
21	looking at the entire sector with data that has
22	implicit in it over time the evolution of technology
23	and the sorts of impacts new technologies have had on
24	load is to draw inferences about how technology change
25	affects total load at the sector level. And because of

- 361
- this econometric forecast for individual sectors
- 2 provide a very good check on the end-use results that
- 3 we develop.
- Q. Perhaps you could just briefly
- 5 explain how the role of end-use models has evolved in
- 6 your forecasting?
- 7 A. End-use modellers have a tendency to
- 8 focus more on future efficiency gains at each end-use
- 9 level and tend to put less emphasis on changing market
- 10 shares and increased utilization associated with higher
- ll income levels.
- The models that Hydro uses have gone a
- long way to rectifying this deficiency in end-use
- 14 modelling practice. Over the last five years, Hydro's
- 15 official long-term load forecast has been set closer
- 16 and closer to the end-use model forecast results. And
- 17 this reflects the improved quality of these models and
- the improved balance of the analysis in them.
- 19 MR. B. CAMPBELL: Mr. Chairman, I am
- 20 about to ask Mr. Burke to go in to a somewhat lengthier
- 21 discussion of the details of the econometric model that
- 22 is principally relied on in forecasting. If there was
- 23 going to be an afternoon break, I understand
- 24 three-thirty is about the time and that this would be a
- 25 good time.

1 THE CHAIRMAN: Your timing is right on we 2 will break for fifteen minutes. 3 THE REGISTRAR: We will recess until 4 three forty-five. ---Recess at 3:30 p.m. 5 6 ---On resuming at 3:45 p.m. 7 THE REGISTRAR: This hearing is again in 8 session. Please be seated. 9 THE CHAIRMAN: Mr. Campbell. 10 MR. B. CAMPBELL: Thank you, Mr. 11 Chairman. 12 Q. Mr. Burke, I would like you to turn 13 now to a discussion of the econometric approach and in 14 particular the material speaks to your econometric model being called EEMO, as I understand it. Perhaps 15 16 you could indicate what that stands for first. 17 MR. BURKE: A. EEMO, that's E-E-M-O, 18 stands for the Econometric Energy Model of Ontario. 19 Q. Perhaps you could explain what sort 20 of data has gone into the construction of that model. 21 This model is built with time series data that go back to 1962. That's the earliest year 22 23 for which a sufficient set of energy and economic variables exist to build such a model for Ontario. The 24 25 data definitions used are consistent with the market

1 reference data set, which I have in my notes as Exhibit 2 88 this time. 3 MR. ROTHMAN: 81. 4 MR. BURKE: Somebody else says it's 81. 5 Anyway... 6 THE CHAIRMAN: Well, we better get it 7 right. 8 MR. B. CAMPBELL: We better get it right. 9 Just a moment. ---Off the record discussion. 10 11 MR. BURKE: It is 81. MR. B. CAMPBELL: Q. And that's the 12 13 market reference data set that was referred to earlier 14 and it is --15 MR. BURKE: A. The same one now. Exhibit 81. 16 0. That data set includes information 17 Α. from 1978 on and it is the same data set and the 18 definitions that are used in the end-use model. 19 The information that we use in the 20 21 econometric model may be traced back to Statistics Canada but there are a few cases where the data we use 22 are not sourced directly from Statistics Canada 23 24 themselves. For instance, for a real GDP by sector for

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Ontario prior to 1971, this data is not published.

1 What Ontario Hydro's economic forecast section has done is to take the real GDP data for Ontario as supplied by 2 3 Statistics Canada --4 THE CHAIRMAN: What kind of sector did 5 you call that? You said a GDP --6 MR. BURKE: By sector. 7 THE CHAIRMAN: I thought I heard you say 8 bi-sector; is that right? 9 MR. BURKE: Yes, by sector for the 10 industrial and commercial sectors is what I meant to 11 say. 12 THE CHAIRMAN: It's in two sectors. 13 MR. BURKE: Two sectors, that's correct. 14 THE CHAIRMAN: Not cutting in half? 15 MR. BURKE: No, that's right. Yes. 16 Classified by sector. 17 THE CHAIRMAN: Oh, "b-y", all right. 18 MR. BURKE: And then we use input/output 19 relationships for the Ontario economy developed by 20 Statistics Canada in order to estimate what the 21 breakout between industrial and commercial real GDP was 22 in that earlier period. 23 Essentially Hydro has attempted to use as 24 full a range of time series data as it can assemble to

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analyse electricity demands econometrically in Ontario.

1	MR. B. CAMPBELL: Q. Having described
2	the sources of the data, how does the EEMO model go
3	about using this data?
4	MR. BURKE: A. Well (Laughter)
5	Q. Have I jumped over? This is entirely
6	possible. This is what comes of late nights I guess.
7	Let me just back up then and deal with
8	the real question that you are expecting and I have
9	obviously failed to deliver to you, which is the
.0	classifications that speak just generally to the way in
.1	which econometric models can be classified in their use
.2	of that data.
.3	A. Okay. The econometric models of
4	electricity demand vary in complexity and they may be
.5	classified sometimes as single-equation models, and
.6	this refers usually to one equation for the total
.7	system demand for electricity.
.8	Sometimes you may here of disaggregated
.9	single equation models, and these refer to single
20	equations for each of the end-use consuming sectors,
21	that is, an equation for residential, one equation for
22	commercial, one equation for industrial, and what are
23	called multi-equation models which have more than one
24	equation per sector. And EEMO is in the latter class.

It is a multi-equation model.

1 In general, the more equations you have 2 per sector the more complex the relationships that may 3 be estimated for that sector. Disaggregating by sector 4 rather than using a single equation approach for the 5 total system is very important because it's only when you are modelling by sector that you are able to 6 7 capture the future changes in the composition of 8 electricity demand. 9 And this matters because the intensity of 10 electricity use varies significantly by sector, and the 11 structure of the consumption and production decisions 12 that people make in their use of energy and electricity 13 also differ by sector. 14 EEMO models energy consumption for all 15 fuels -- well, the major fuels. Usually electricity, 16 oil and gas, and in the industrial sector we add coal. The emphasis for us is clearly on getting a good 17 18 electricity demand forecast and in the course of doing 19 so we project the other fuels as well although we 20 probably put less stake in the other fuels forecasts 21 than in the one for electricity itself. 22 Now I take it that EEMO is documented 0.

in Exhibit 77, which is entitled "The 1990 econometric Load Forecast Report"; is that correct?

A. That's correct.

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25

- 1 Q. Now, I don't want you to take us 2 through it in excruciating detail, but I would ask you 3 to summarize how EEMO deals with the key economic 4 relationships that affect electricity use. 5 A model such as EEMO may be well characterized by its elasticities. Elasticities in the 6 7 case of an electricity-demand model are the empirically 8 estimated sensitivities of electricity demand to the major explanatory variables. In this case we are 9 10 talking about income, output, by sector, electricity prices, and fossil fuel prices. 11 The overhead that is up, No. 5, gives the 12 13 elasticities for the various kinds of effects, that is with respect to electricity in the first column, with 14 15 respect to liquid fuels in the second column, and with respect to output and income in the third column. And 16 by sector down the page. 17 18 I want to add one more thing. These elasticities were requested in numerous interrogatories 19 and we have picked one that it is in the package that 20 you have before you, and that interrogatory is 1.2.9. 21 22 I want you to comment please on the
 - magnitude of these elasticities and the range over which they are useful, and I think the first -- well, perhaps you could deal with that first in the context

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- of the own-price elasticity.
- A. Yes, I will be focussing first on the
- 3 own-price elasticity which is the numbers in the first
- 4 column of the overhead. Own-price elasticities show
- 5 how electricity demand is expected to change in
- 6 response to a change in the price of electricity
- 7 itself.
- 8 In the long run that's the bottom half
- 9 of the table and the long run may be 20 years or
- 10 more, these results indicate that a 10 per cent
- ll increase in electricity rates would decrease
- 12 electricity demand by about 4.2 per cent. That is the
- 13 total impact, the very bottom number in the first
- 14 column.
- The short run effect really refers to the
- impact after the first year after the price change and
- 17 this is quite small and the results for that are in the
- top half of the overhead.
- 19 About half the total price impact on load
- 20 is felt after about five years into the future. The
- 21 sort of full time profile of the load impact of a price
- 22 change is shown in Interrogatory 1.10.80, which is also
- 23 part of the package supplied to you.
- 24 What this elasticity suggests is that
- other things equal, the roughly 20 per cent increase in

1	real electricity prices between 1990 and 2015 that is
2	included in the 1990 load forecast would eventually
3 •	reduce electricity demand by 8.4 per cent. However
4	THE CHAIRMAN: I'm sorry, I thought you
5	said 10. I am trying to follow you. You said 10 per
6	cent the first time and then you said 20 per cent
7	MR. BURKE: Yes, 10 per cent was just to
8	indicate of order of magnitude of the elasticity. Ten
9	per cent applied to an elasticity of minus 0.42 yields
10	a 4.2 reduction
11	THE CHAIRMAN: Oh, I see. All right.
12	MR. BURKE: In practice, what we have in
13	the load forecast is a 20 per cent change in rates over
14	the next 25 years and that would yield roughly double
15	that impact on load.
16	Now that is in the long run. Given the
17	time profile of the projected rate increase, which
18	occurs initially, and then the last 10 per cent or so
19	occurs in the last ten years of the forecast period.
20	The full impact of the rate change would not be felt by
21	2215. I would estimate about 6 per cent decline in
22	load in practice associated with the rate profile that
23	is in the 1990 load forecast.

1	The own-price elasticity that we have in
2	EEMO this year is very similar to the values we have
3	estimated in recent years, something around minus .4.
4	Hydro also has single-equation models and they suggest
5	a value around minus .5. However, given the nature of
6	the history of electricity price changes, it really
7 .	doesn't makes sense to quibble too much over the
8	difference between these two estimates. Something of
9	the order of minus .4 and minus .5 is appropriate for
10	this sort of analysis.
11	MR. B. CAMBPELL: Q. I would ask you to
12	address that latter point and indicate your view as to
13	how useful these elasticities are for price ranges
14	price changes that are significantly beyond the kind of
L5	range that has been experienced?
16	MR. BURKE: A. If we could have the
17	overhead.
18	This overhead is taken from the
.9	electricity price data set that is used to estimate
20	EEMO. It's page 6 of the package that was issued.
21	As you can see from it, there has been
22	very little variation in electricity prices in
23	Ontario's history, at least since 1962. You can see
24	that depending on the sector there was a gradual change
25	between 1962 and the mid-70s. Then there were two

- 1 years with substantial rate increases, 1976 and 1977; 2 in those two years, rates increased 13 per cent and 21 3 per cent respectively in real terms. And since then 4 rates have been fairly stable, rising slightly over the 5 remainder of the historical period. 6 What that means is that there is actually 7 very little information historically with which to 8 assess the load impact of price changes in Ontario and 9 certainly very little information to assess the impact 10 of large price changes on load in Ontario. We have no 11 idea whether or not large price changes could change 12 the overall economic performance in Ontario. Certainly 13 nothing has happened historically which would lead to 14 such changes being implicit in the numbers that have 15 been estimated. 16 And it is also quite uncertain whether it 17 is appropriate to apply an estimated elasticity from 18 data like this to large price changes, that is, above 19 the sorts of price changes that have occurred
- Q. I want to turn then to the
 relationship between the prices of electricity and
 liquid fuels. I believe that was the second column on
 your elasticities chart, which is page 5.

number, and that was for the year 1977.

historically like 21 per cent which was the largest

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1	And first can you tell us what you mean
2	by liquid fuels, what you include in that category, and
3	then go on and explain what a cross-price elasticity is
4	and discuss that one?
5	A. Certainly. Liquid fuels is just a
6	combination of oil and natural gas.
7	What a cross-price elasticity is, that is
8	the change in electricity demand in response to a
9	change in the price of another fuel, in this case the
10	combination of oil and natural gas, both changing at
11	the same time.
12	The estimate in total in the long run is
13	given at the very bottom of the middle column, and as
14	you can see it's zero, which suggests that, other
15	things equal, a change in fossil fuel prices does not
16	change electricity demand in the long run.
17	This is the net result of two cross
.8	elasticities that you can see at the sectoral level, a
.9	positive cross-price elasticity of .16 in the
20	residential sector, and a negative cross-price
21	elasticity of minus .14 in the industrial sector. The
22	reason these two balance out is because the industrial
23	sector consumes more electricity than the residential
24	sector and the weighted average is zero for these two

numbers.

What the residential cross-price
elasticity means is that a 10 per cent increase in
fossil fuel prices in the residential sector will
increase electricity demand 1.6 per cent, other things
equal. And this might seem like a modest effect but it
is important to bear in mind that in the residential
sector, the major end-uses for which inter-fuel
substitution could occur are space heating and water
heating; and these two end-uses represent less than 40
per cent of electric load in the residential sector.

So that effectively for the sector as a whole, the elasticity of inter-fuel substitution, which is effectively what we are dealing with here, is being diluted by a factor of two to three times by the inclusion of all these other end-uses for which no inter-fuel substitution is likely.

In the industrial sector, electricity demand is estimated in a two-stage process, and this is described in the 1990 load forecast and Exhibit 77.

This model for the industrial sector suggests that a large increase in oil and gas prices will reduce total energy demand significantly, and in fact, will more than offset the increase in the electricity — that will more than offset the impact of the increase in the electricity market share in that sector.

Essentially, what we have here is an

2	increase in oil and gas prices shrinking the pie.
3	Electricity gets a larger share of a smaller pie and
4	ends up on net a smaller with a smaller quantity of
5	electricity use, given price increases in fossil fuels.
6	This negative cross-price effect
7	essentially suggests that in the long run electricity
8	is complementary with oil and gas in the industrial
9	sector. And I think when you think back to what
10	happened after the oil price shocks of the 1970s, that
11	that is plausibly what happened: that the increase in
12	oil prices in the late '70s had the effect of actually
13	decreasing electricity use, increasing market share but
14	decreasing electricity use.
15	Q. Overall?
16	A. Overall.
17	Q. Now, when you are looking at the
18	impact of a large fossil fuel price increase, again
19	does the cross-price elasticity alone give you the
20	answer for large price changes?
21	A. No. And this is because large fossil
22	price shocks also impact on the economy as a whole,
23	both in the short-term and the long-term. So that if
24	you want to analyze the full effect of a large oil or
25	gas price shock, you also have to take into account the

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income effect of that price change. Effectively, when
oil and gas prices increase, it acts like a tax on the
economy as a whole.

Ontario Hydro maintains an internally consistent set of forecasts so that were we to have a large increase in oil and gas prices in the future, we would also have to take into account a slower rate of growth for GDP.

The reason I mention this topic is because in this day of consideration of carbon taxes to depress greenhouse emissions, the possibility of higher fossil fuel prices exists and the effect of the zero cross-price elasticity does not mean that carbon taxes would have no impact on electricity demand. It wouldn't come through the cross-price effect; it would come through the income effect. It also matters how large the price increase is, or the tax increase that such a carbon tax regime might bring about.

- Q. I take it that again that leads some caution about the proper use of this cross-price elasticity estimate. Perhaps you could just address that, if there is anything additional you want to add in that area.
- A. If you could put on overhead No. 7.

 That corresponds to page 7 of your package. This

1	overhead illustrates the price of electricity and the
2	price of natural gas efficiency adjusted for their use
3	in combustion for heating, space heating, over the
4	period 1961 to 1990.
5	The point of this overhead is that the
6	price gap between these fuels has been substantial
7	historically. At the beginning of the period,
8	electricity was about 60 per cent more expensive than
9	natural gas; at its closest in the early 1980s,
L 0	electricity was 35 per cent more expensive than natural
11	gas; and by the end of the period currently, it's
12	nearly twice as expensive as natural gas.
13	Really, what this means is that natural
14	gas has been so inexpensive relative to electricity
.5	that any inter-fuel substitution that has occurred
.6	not any, but that if inter-fuel substitution has
17	occurred, it has quite often occurred for non-price
18	reasons, that pure price changes have not induced
.9	shifts between these fuels.

The sort of non-price factors that would have induced people to use electricity are such things as the controllability of the fuel, its convenience, cleanliness in use, perhaps the quality of the products that may be produced using electricity-using technologies. However, what this means is that the

- cross-price elasticity has been estimated in an era for
 which relatively little inter-fuel competition is
 actually taking place on price terms.
- 4 However, were we to increase fossil fuel 5 prices significantly so that uses like space and water 6 heating in the residential and commercial sectors or process heat in the industrial sector suddenly became on a cost basis competitive with electricity, then we 8 9 would see very different inter-fuel substitutions occurring; and, in fact, major new markets for 10 electricity would open up, and the cross-price effect 11 12 that we have estimated for this historical period would not apply. It only applies in a range in which there 13 14 is very weak competition between these fuels.

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Substantial price increases of the order that I have suggested in interrogatory response No.

1.6.50, which suggests that prices of the order of two or three times the current price for natural gas whilst electricity prices are held constant, that sort of price change would make a difference and we would be into a very different market.

Q. Now, the other elasticity that you have spoken of with respect to the EEMO model, I think it's the third column there, is input or output elasticities, and perhaps you would explain what is

- 1 meant by that term.
- 2 A. Yes. The income elasticity shows the
- 3 change in electricity demand as a result of a change in
- 4 income. In the residential sector income is the
- 5 appropriate variable; in the commercial and industrial
- 6 sectors, it's real output or real GDP that measures the
- 7 activity level.
- 8 EEMO's income elasticity is given in the
- 9 bottom line of the right-hand column. It's 1.08 in the
- long run, and that implies, other things equal, that a
- load growth will be slightly faster than GDP growth
- 12 according to this econometric estimate.
- The 1990 load forecast has a GDP level in
- the year 2010, which is about five-and-a-half per cent
- above the GDP level which was contained in the GDP
- 16 forecast, in the forecast used for the Demand/Supply
- 17 Plan. This change between the two forecasts, between
- 18 the DSP forecast and the 1990 forecast, would suggest
- that load should be about 6 per cent higher in this
- forecast than the one that we submitted to the Board in
- 21 the DSP document.
- Q. Now, has the income elasticity been
- 23 stable at this value for a considerable period or has
- 24 there been a trend or change in that elasticity value
- 25 over time?

A. Yes, there has been a change in the elasticity value over time. And to put the income elasticity into some historical perspective, I am going to simplify the concept slightly and use something which is a close proxy to the income elasticity because it is more intuitively appealing, and that is the ratio of the growth of load to the growth of GDP.

In Ontario since 1950, load growth has averaged 5.7 per cent and the GDP has grown at about 4.2 percentage, and this gives a ratio of about 1.35 over the 40-year period. But there is a distinct trend in this ratio. In the 1950s the ratio was about 1.9; in the period 1960 to the mid-70s, the ratio was about 1.3; and since 1976 or so, the ratio has been very stable at around 1.

The data set that I mentioned we used for EEMO starts in 1962, and so it's really only working with two-thirds of this period, and this is one reason why it is possible that the income effect in EEMO may overstate future income effects and not have captured the full extent of the trend toward lower income elasticities in the long-term.

My conclusion from that would be that there is a slight tendency perhaps for EEMO to over-forecast based on this observation.

Q. All right. Now, I am going to ask you to address the recommended forecast later, which takes into account all of the model results. I am going to ask you first, though, at this juncture just to outline how the 1990 EEMO results overall, when you combine all of the three sectors, compare to the results for that model that were submitted in the Demand/Supply Plan.

- A. I will be quite brief on this. The total EEMO demand forecast is up about two-and-a-half per cent in each of the years 2000 and 2010 relative to the forecast that was submitted for EEMO in the Demand/Supply Plan. This change is the net effect of several offsetting changes in assumptions; one is higher GDP, another is higher electricity prices. And also the models themselves have changed, and this has caused a change in the sort of forecast it prepares.
- Q. I am going to ask you to bring all of the results together later on, but I want to turn first to Dr. Buja-Bijunas and ask you to address the end-use models for which you are responsible, and I would first ask you if you could outline for the panel, please, or give an overview of the main components of an end-use approach.
 - DR. BUJA-BIJUNAS: A. Basically, there Farr & Associates Reporting, Inc.

1	are five components to an end-use approach. The first
2	component is your drivers which are the actual users of
3	electricity, the users of the various end uses. And
4	what we look at are residential households, commercial
5	floor space in physical terms, the actual square
6	footage in the commercial sector, and also industrial
7	output to the extent possible and physical terms. So
8	we look at tonnage of steel produced and we look at
9	tonnage of newsprint, for example, as physical output.
10	So as these particular users grow in the future, they
11	will affect electricity use.
12	And you have to forecast not only the
13	growth of these drivers, but also compositional changes
14	of these various drivers. What I mean by that is
15	residential households; people can live in
16	single-family dwellings, they can live in
17	single-detached homes, they can live in duplexes,
18	triplexes, et cetera, and it turns out the way
19	electricity is used in these various types of household
20	is different. So you have to also forecast
21	compositional changes of your drivers. That's the
22	first thing.
23	The second thing is the penetration of
24	energy-using services. What I mean by that is the

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percentage of your drivers that actually use an

1	end-use. Not all your households have to have
2	dishwashers, only a certain percentage have that, and
3	so you have to know what the existing percentage is and
4	also how to forecast out how that percentage will
5	change over time.
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1	The third issue is fuel share. For
2	certain end-uses like lighting, for example,
3	electricity is used as the only fuel possible to supply
4	lighting as an end-use.
5	For other end-uses, like space heating in
6	homes, the homeowner has a choice of electricity or oil
7	or gas. So, it is not just the penetration of the
8	end-use, but it is also what fuel is used to supply
9	that end-use.
0	So, you have got, for example, your
1	households and they have decided whether or not they
2	want an end-use and they decide what sort of fuel they
.3	want to use for that end-use.
4	THE CHAIRMAN: I am having just a little
.5	bit of a problem hearing. I wonder if you could move
.6	the microphone just a little closer.
.7	DR. BUJA-BIJUNAS: Okay.
.8	THE CHAIRMAN: Sorry.
.9	DR. BUJA-BIJUNAS: The fourth concept
0	that you deal with is efficiency. Once you have
1	established how many appliances there are out there,
2	you have to know what efficiency these appliances are
13	operating at.
4	And when I use the term "efficiency," I
25	do that in a very technical or engineering sense. It

1 is the amount of energy required per unit of service level; the amount of energy required, for example, per 2 3 litre of refrigerator. You have to combine that with the last 4 5 concept, which is utilization or service level, and that represents a factor such as the number of hours an 6 end-use is used, as well as physical changes brought 7 8 about by the demand for a higher level of service. 9 For example, you might have a more 10 efficient refrigerator, but if you buy a larger 11 refrigerator, the two aspects combine to result in what the actual energy use is of that refrigerator. A more 12 13 efficient refrigerator which is just larger will use 14 more energy. 15 So, those are the five basic concepts 16 that have to be considered in end-use analysis. 17 MR. B. CAMPBELL: Q. Now, the models that are discussed in the various exhibits that have 18 been filed in this area are under various acronyms: 19 20 REEPS, COMMEND, INDEPTH. They were described earlier 21 as being developed by the Electric Power Research 22 Institute, described as a California-based 23 organization. 24 Can I take it that these models were

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customized for use in Ontario?

-	DR. BOOK-BIOOMAS: A. 165, they were.
2	What these models really are what they basically do
3	is provide a framework for analysis, a method of
4	analysis, but they must be customized before they
5	really represent your particular situation. And this
6	customization is often referred to as calibration of
7	models.
8	And in calibration what you do is that
9	you take Ontario survey data, for example, data which
10	represents Ontario penetration rates or energy levels,
11	fuel choices that have occurred, and you adjust your
12	model so that these particular data points are
13	reproduced by the model. And once it is calibrated as
14	such, you use that for your forecasting.
15	Q. All right. And just before turning
16	to the model results, I just want to focus on one of
17	the five components of the end-use model that you have
18	described and that is at efficiency improvements.
19	I would ask you, please, to the describe
20	or outline what extent you have considered the impact
21	of government efficiency standards for purposes of the
22	end-use forecast, and this is a matter that Mr. Burke
23	will also be addressing later on.
24	What I want you to do is just tell us
25	what is actually in the forecast model.

_	A. The 1990 Tolecast was the first time
2	that we incorporated government standards into the
3	basic forecast.
4	The standards which were identified at
5	the time of forecast finalization and were well enough
6	defined in terms of the date of implementation as well
7	as the possible impact were included, and only those
8	standards included.
9	What that means is that standards for
10	single-family dwellings in the residential sector, as
11	well as standards for multi-family dwellings, apartment
12	units, in the commercial sector, were incorporated in
13	the forecast.
14	These standards addressed a number of
15	end-uses. In particular, the 1990 forecast
16	incorporates the impact of the upgraded 1991 Ontario
17	Building Code.
18	We also incorporated heat pump standards
19	for 1992, space cooling standards for 1994, and they
20	address heat pumps, central air-conditioning and window
21	units, water heating standards for both 1990 and 1994,
22	as well as refrigerator/freezer standards for 1994.
23	We recognize that it is the intent for
24	Ontario standards to harmonize with U.S. standards, and
25	a number of these standards specifically are aimed at

- 1 addressing U.S. levels to be implemented in 1993. 2 Q. Would you expect that actual 3 consumption of electricity would immediately decrease 4 by the full extent of the standard when that is 5 implemented? 6 A. In actual fact, that is not really 7 You have to keep in mind that a standard the case. affects the efficiency level of a given appliance. It 8 doesn't affect direct -- what is does mean is that 9 10 actual consumption will not go down by that full 11 efficiency improvement if there are utilization impacts 12 that can offset this. 13 And a very good example is the 14 refrigerator/freezer case: Refrigerators about ten years ago averaged about 14 cubic foot in size. Now 15 16 they average about 18 cubic foot in size. And looking 17 at the population of models sold, there is a trend towards larger refrigerators with a lot more features 18 that are electricity intensive. 19 20 As a consequence, these efficiency standards - for example, a refrigerator is 45 per 21 cent - are only forecasted to actually result in 22 23 consumption going down 33 per cent because of the offset of utilization. 24
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Q. All right. Now, am I correct to say

1 that how the various figures were arrived at as to the 2 effective standards and the particular standards that have been incorporated are set out in Exhibits 16 and 3 17 which cover the residential end-use and commercial 4 5 end-use analysis? 6 Α. That's correct. 7 Q. Now, I am going to ask you to move 8 through the different sectors of the end-use approach, 9 and I guess the first one I would like you to start with is to give some of the key results and assumptions 10 11 for the residential sector. 12 Okav. I will start off with chart Α. 13 No. 8. 14 And that is chart No. 8 in Exhibit 0. 15 1002 16 That's right, and that gives Α. 17 residential electricity consumption. 18 Okay. The first thing I want to do is look at what the forecast is for the number of 19 20 households over the forecast period; and the number of households is forecast to grow at 1.2 per cent per year 21 22 on average over that period. 23 If I look at total residential 24 electricity demand over the same period, it is forecast

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to grow at a higher rate: 1.6 per cent per year over

1 that same period. 2 Now, if you look at this particular 3 overhead, this shows you the relative contribution of 4 the various end-uses in terms of share of electricity 5 use in the residential sector, both currently and at 6 the end of the forecast period. 7 One of the first things you notice is 8 that appliances account for a very large portion of 9 electricity consumption in the residential sector. 10 Within appliances, I include refrigerators, freezers, 11 stoves, dishwashers, as well as all other end-uses such 12 as lighting, clothes dryers, TVs, et cetera. If I look at appliances as an aggregate 13 14 over the forecast period, appliances are forecast to 15 grow at 2 per cent per year over the forecast period. If I look at the portion of appliance 16 electricity use that is not accounted for by your basic 17 white appliances - in other words, of the 56 per cent -18 if I leave out refrigerators, freezers, stoves and 19 dishwashers and just have that 'other' category, that 20 'other' category is forecast to grow by 2.8 per cent 21 22 per year. To get that in some sort of context, this 23 'other' residual category grew by 5.3 per cent per year 24

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over the period 1973 to 1988; whereas residential use,

- excluding that category, only grew at 3.9 per cent.
- So, you have one component here of residential
- 3 electricity use growing at a much higher rate than the
- 4 other more traditional end-uses.
- 5 Future growth in this other category is
- 6 assumed to be driven primarily by income. And when you
- 7 think of what sort of things are inside that category,
- 8 that makes sense. Typical future others are PCs,
- 9 entertainment units, kitchen and other convenience
- appliances, including those, we recognize, have not yet
- ll been identified but will be developing in the future.
- The second largest end-use in the
- residential sector is space heating, which accounts for
- 14 21 per cent electricity use and is forecast to grow at
- 1.5 per cent per year, somewhat higher than the growth
- rate of the number of households.
- Q. Now, I would like you to deal with
- that latter one because it is clear that some
- increasing portion of the space heating market that is
- 20 now served by sorry that you expect an increasing
- 21 portion of the space heating market to be served by
- 22 electricity; I would like you to just deal with why and
- how you arrived at that view.
- A. Okay. If I look at the historical
- development of space heating fuel shares, the

1	penetration of electric space heating in single-family
2	dwellings has increased substantially over the last two
3	decades.
4	In 1973, 6 per cent of all single-family
5	dwellings were electrically heated. Ten years later,
6	in 1973, 12 per cent of all single-family dwellings
7	were electrically heated.
8	Currently
9	Q. I think it is '83? Ten years later
.0	is '83?
.1	A. I'm sorry, 1983, yes. Currently,
.2	somewhat over 19 per cent of all single-family
.3	dwellings are electrically heated. Those percentages
. 4	apply to the total stock of single-family dwellings.
.5	If you look at new stock, the new homes
.6	currently being built, we refer to that as the marginal
.7	fuel share, the increment in fuel share. Currently, 32
.8	per cent of all new homes being built choose
.9	electricity as their space heating option.
20	As far as our forecast is concerned, we
21	have forecasted that this marginal share will decrease
22	slightly in the near term in response to price effects
23	that Mr. Burke alluded to.

reverse that somewhat to lead to somewhat of an

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And in the long term, price effects will

- increase in marginal fuel share, to 38 per cent from
 the current 32 per cent.
- One thing that really has to be

 considered when you are looking at electric fuel shares

 is gas availability because that certainly does play a

 major role in determining a fuel share.
- Gas availability has been roughly 75 per
 cent; in other words, it is available to 75 per cent of
 households in the province and it has been around that
 level for the past ten years.

- It is not really clear how much more expansion is likely into rural areas, for example. And so, therefore, one has to consider in these fuel share forecasts rural versus urban construction and the effect on fuel share.
- In addition, housing type does play a major role also in fuel choice. Single-detached dwellings have a much lower penetration of electricity as their space heating choice compared to duplexes, triplexes and row.
- So, to the extent that there is actually -- we are forecasting somewhat of a shift towards duplexes and triplexes compared to the more traditional single-family dwellings, that also has an impact on the choice of electricity as your space

- heating option.
- So, I just spoke about the fuel share
- 3 aspects of space heating when you are looking at the
- 4 space heating end-use. Rounding that out, we looked at
- 5 the 1991 Building Code and heat pump penetration to
- 6 result in space heating efficiency gains to finally
- 7 arrive at our space heating numbers.
- Q. All right. I want to turn then,
- 9 having dealt with some of the major aspects of the
- 10 residential forecast, to the commercial sector. And
- ll again, start with some of the key results and
- 12 assumptions that apply in the commercial sector.
- 13 A. Okay. This is chart 10. What this
- 14 chart gives you is four of the key end-uses in the
- 15 commercial sector and the forecast for growth of these
- 16 end-uses.
- 17 If I look first at the driver, total
- 18 commercial floor space is forecast to grow at 1.4 per
- 19 cent per year. Total commercial demand is forecast to
- grow at 2.5 per cent per year.
- 21 If I look at the various types of
- 22 commercial floor space, and we look at about a dozen
- 23 different building types, multi-residential in other
- 24 words, apartments offices and retail floor space
- 25 actually account for 60 per cent of all the floor space

1	in the commercial sector. And they also, as a group,
2	account for 60 per cent of all the electricity used in
3	the commercial sector. So, keeping an eye on what is
4	happening to offices, retail and apartments is very
5	important.
6	If I look at the various end-uses,
7	lighting, which currently has a share of 35 per cent of
8	the electricity used in the commercial sector, is
9	forecast to grow at, more or less, the rate at which
10	square footage is forecast to grow in the future.
11	When we consider lighting, this is one
12	particular end-use where the whole issue of utilization
13	and how it might offset efficiency is very important.
14	When we look at lighting, for example,
15	for the retail sector, we look at efficiency
16	improvement such as retrofitting with 34 watt bulbs for
17	existing floor stock.
18	In addition, for new floor stock
19	editions, we look at the use of T8-32 watt bulbs,
20	electronic ballast, as well as new reflecting systems.
21	Putting all of these considerations
22	together and expected penetration rates of these
23	various efficient technologies leads to an efficiency
24	improvement of about 13 per cent.
25	However, what we have also assumed is

1 that there will be an offsetting 16 per cent increase in utilization brought about by longer opening hours, 2 3 additional store hours, which will offset the 4 efficiency improvement. 5 So when you look at our energy use per square foot number, it looks flat: it does not mean 6 7 that in point of fact we do not assume substantial 8 increases in the efficiency of lighting system. 9 If we now look at heating; heating 10 accounts for 9 per cent of electricity use in the 11 commercial sector, and these results are found in chart No. 12. 12 13 If I look at current space heating 14 marginal shares - in other words, the choice for your 15 heating fuel for new commercial space - for 16 multi-residential offices or retail, the marginal shares currently range from about 40 to 55 per cent. 17 There is a very high penetration of electricity as a 18 19 space heating option for this type of commercial space. When we look at an explanation for why 20 this is the case, why it should be so high, it turns 21 22 out that non-price issues are a very significant determinant of the choice of electricity as a space 23 heating option, especially in things like offices and 24

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apartment units.

1	Builders choose electric systems due to
2	factors such as ease of control and certainly
3	individual metering capabilities.
4	In addition, heat pumps also provide dual
5	heating and cooling capabilities. And more and more,
6	office, retail and apartments are built with
7	air-conditioning capability, so that heat pumps are
8	attractive because of this dual capacity.
9	If I turn to the next chart, which is
10	chart 13, office equipment accounts for 11 per cent of
11	electricity use and is forecast to have the strongest
12	growth of all the end-uses in the commercial sector at
13	4.3 per cent annually over the forecast period.
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1	What I mean by office equipment are
2	things like PCs and minis and mainframes, and
3	peripherals like printers and photocopiers,
4	point-of-sale terminals, automatic inventory control
5	units, the sort of scanners you have in Loblaws when
6	you check out, and all those sorts of electrical
7	equipment.
8	What we have done is what we have done an
9	accounting basically of the number of PCs there are out
0	there right now, which happens to be 560,000 PCs or one
1	for every three employees, and forecasted the future
2	growth of PCs based on employee number.
.3	We did the same thing with point-of-sale
4	terminals, for example, looking at how many there are
.5	in various types of food stores, et cetera, and
6	forecasted that out, and have come up with our strong
.7	4.3 per cent growth for this type of equipment.
8.	Finally, another way of looking at the
9	commercial sector is given in Chart 14. What I did
0 :0	initially was that I looked at the commercial sector by
21	end-use to see how much each end-use was growing.
22	What you can also do is combine all your
23	efficiencies and your penetrations and your growth of
4	floor space to come out with growth by building-type to
25	see what types of building are contributing the most to

your growth and commercial electricity demand, which is 1 what is seen in this overhead. 2 As you you can see, offices, retail, and 3 4 apartments will be growing at guite a clip over the 5 forecast period with offices having the strongest 6 growth demand, followed by retail and multi-7 residential. 8 Q. And again the details behind these 9 numbers, the analyses and so on, as I understand it, is 10 set out in Exhibit 17 if I am correct, which is the 11 commercial end-use forecast document. 12 Α. That's right. 13 All right. I want then to turn to 14 the industrial sector key results. THE CHAIRMAN: Perhaps if you are turning 15 16 to the industrial sector, we can break for the day. 17 Would that be all right? 18 MR. B. CAMPBELL: That would be fine. 19 THE CHAIRMAN: We will do the industrial 20 sector tomorrow morning at ten o'clock. 21 THE REGISTRAR: We will recess until ten 22 o'clock tomorrow morning. 23 ---Whereupon the hearing was adjourned at 4:40 p.m., to be reconvened on Wednesday, April 24, 1991, at 10:00 24 a.m. 25 JB/KM/JAS [c. copyright 1985]

